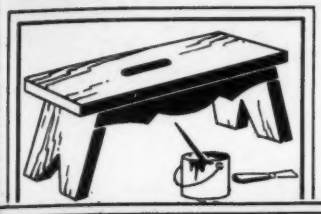

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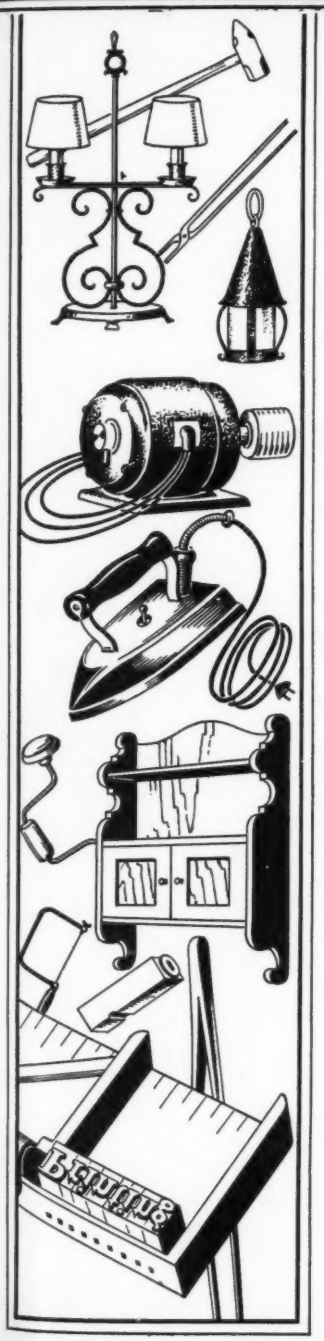

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Schoon op de weereld veel te vinden:
Ik draai gevlamt of effenrond,
En dat geschied op vasten grond.

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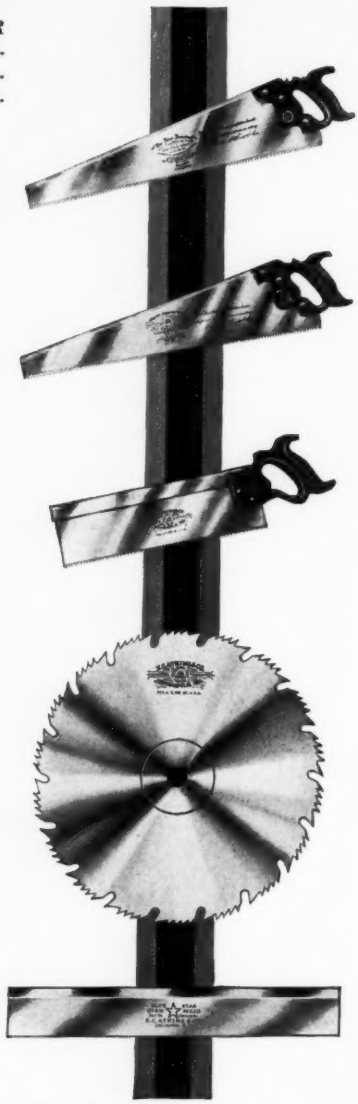

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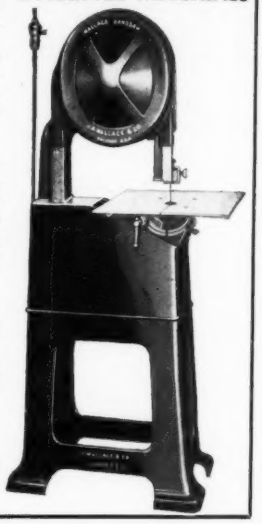

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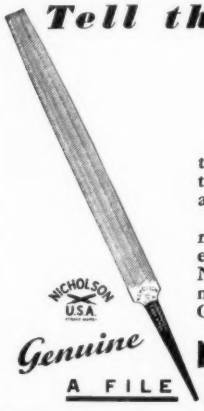

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STANLEY TOOLS

INDUSTRIAL ARTS and VOCATIONAL EDUCATION
August, 1934
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The Content of Trade Theory

Oliver W. Barrick

Director Vocational Education,
Hanover High School, Hanover, Pennsylvania

A helpful outline which will assist shop teachers in working up the theoretical work that is to accompany their shopwork. The theoretical subject matter for cabinetmaking is included in the article.

MUCH discussion and difference of opinion has resulted in trying to determine of what the subject of Trade Theory should consist.

The first sentence under the subject of Trade Theory in the *Syllabus on Unit Trade Courses in High Schools,* published by the Department of Public Instruction of the Commonwealth of Pennsylvania, contains this statement: "This subject will contain all the auxiliary trade information which the mechanic should have and which is not contained in drawing, mathematics, or science."

Several paragraphs farther, there is another statement which says: "The following outline is indicative of the general field covered in a trade-theory course. The particular topics will vary in importance for different trades. This subject will be adequately covered for any trade if the topics indicated are sufficiently developed for that trade."

The topics given are:

1. Trade terms.
2. Safety and hygiene.
3. Knowledge of machinery.
4. Knowledge of tools.
5. Knowledge of stock.
6. Trade analysis and special methods of work.
7. Shop organization and management.
8. The shop product
9. History and development of the trade.

The foregoing topics make a splendid basis for the building up of a course in trade theory in general. Teachers in certain trades will believe some other phases of their trade of sufficient importance to warrant detailed study by the class.

As a teacher of cabinetmaking, I would consider several more topics in the list, as follows:

a) Wood fasteners.
b) Avoiding waste.
c) Wood turning.
d) General principles of construction (including the various joints).
e) Furniture finishing.

The first of these subjects, "Wood fasteners," may be considered by some to belong to topic 5. It could be included under that topic, but on account of its character and importance in the everyday work of the trade, it may be put in a separate list.

The second subject, "Avoiding waste," may be considered as belonging to topic 7. However, in some trades it may be that "avoiding waste" would be a more suitable subject to teach an apprentice than "Shop organization and management." It may be made part of topic 7, if the course contains plenty of time to adequately cover all the subjects listed. If not, the subject should be taught instead of topic 7, as it seems a little untimely to teach shop organization and management to a boy who has not mastered a trade.

The subject of "Wood turning" may be used as another topic, or it may be included in topic 6.

"General principles of construction" may perhaps be included under topic 6, but it is rather a broad subject to include with others, as it should deal with all the principal joints and their uses.

The last of the extra subjects, "Furniture finishing," may be covered, if desired, under topic 8, which deals with the shop product in general. The subject may be dealt with using all the material under the general topic, or it may be divided so that "Furniture finishing" deals with its own section, and the "Shop product" shall deal with such matters as quantity, shipment, and disposition of the product.

The chief difference of opinion on the part of instructors as to the proper topics to be taught under the subject "Trade Theory," are due chiefly to the limited time which is allowed for the subject in school, and the necessity for teaching the most important topics in the allotted time.

As there is no book in print dealing with the subjects mentioned from the standpoint of Trade Theory, it might be a help to teachers of cabinetmaking and industrial arts to have an outline of each topic which may be followed in class. Of course, each teacher would need to draw from his own trade experience in teaching the class.

The outline should show as completely as possible the proper arrangement and classification of the many terms, operations, and other trade knowledge needed in each of the main subjects.

Trade Theory — Cabinetmaking
Trade Terms

One of the first things which a trade-course instructor will find that he needs to teach the students in his Trade Theory class is the terms or expressions used in the trade. It is necessary that the students understand fully the meaning of the various terms, so they are able to comprehend the explanations of the different jobs of construction that are offered by the teacher.

These terms cannot be taught all in consecutive lessons, as most of them would be forgotten. When an instructor uses a term in his explanation which is not generally known, he should make the meaning of the term plain to the students. From this, it will be seen that trade terms will be appearing in the work continually, and it is very convenient to have a list of them at hand. The list should be as complete as possible for the trade.

For convenience in use, the terms are arranged in alphabetical order. The instructor should see to it that all the trade terms possible are explained during the first semester, and the entire list should be covered the first year.

Tools, machines, and other things may seem to be trade terms, but if they appear to have a place in another chapter, as indicated later on, they should not be in both lists, except in the case of special tools, tool parts, machine parts, etc.

Other lists may be outlined on the following:

Safety and hygiene.
Knowledge of machinery
Knowledge of tools.
Knowledge of stock, including wood fasteners.
Trade analysis and special methods of work, including wood turning, and general principles of construction.
History and development.
The shop product, including furniture finishing.
Shop organization and management, including avoiding waste.

The following list of trade terms are considered of such importance to a knowledge of the trade that they should all be included in the instructor's list. Others may be added if he thinks it necessary.

accurate
adjust
alignment
air-dried lumber
angle
apron (of table)
arc
base
batten
bead
bench hook
bevel
bill of material
binding of saw
bisect
bit
blade of plane
blade of chisel
blade of saw
board
board foot
board measure
body
bolts
boring
brads
brush
buckling of saw
butt joint
butt hinge
carriage bolt
caster
center
center line
chamfer
checked lumber
cheek
choking (of plane)
chuck (of a brace)
circle
circular
circumference
clamp (of plane)
claw hammer
cleat
clinched
close grain
coat
comb grain
construction
corner
counter-bored hole
counter-sunk hole
cross grain
cross-lap (joint)
curve
cutter (of plane)
dado
dead center
diameter
dog
door
door snap
dovetail
dowel
drawer
drawer pull
dress
dried out
drier
drilling
dull
edge
end
end grain
escutcheon
face
face-off
faceplate
ferrule
filler
flush
gain
glue
gluing
grain
green
groove
half-lap (joint)
handle
hard wood
heel (of plane)
hollow
jaws
jig
job
join
joint
joinery
keen
kerf
kiln-dried lumber
knock-down
knot
knotty
knurled
lap
latch
layout
live center
live end
lumber
"M"
machine bolt
matched
miter
miter box
mortise
oil stain
open grain
opposite
paint
panel
paring
peen
piece
plank
rabbet
radius
rail of table
ratchet
r.p.m.
sandpaper
sap
sappy
seasoned lumber
secret dowel
sector
segment
set
setscrew
shaft
shank
sharp
shellac
shoulder (on tenon piece)
side
sizing
skew chisel
slash grain
soft wood
solid
solvent
spirit stain
split
spur of gauge
spur center
squaring-up
staggered
stain
steel wool
stove bolt
straight
straightedge
strap hinge
surface
surface-off
s-2-s
s-4-s
sweep (of brace)
tang
tangent
taper
tee hinge
temper
tenon
timber
toe (of plane)
toenail
tongue
tongue and groove
toolrest
trimmer
trimming
turning
turpentine
undercut
varnish
waney
warped
wind
winding sticks
wind shaken
wire edge
working edge
working face

Safety and Hygiene

The essentials of the following outlines are important in teaching the subject of Trade Theory. As much of each outline may be used as desired, depending on the shop conditions, apparent need, and time available.

Safety in the shop

1. Guards provided on machines to cover
   - *a*) Gears
   - *b*) Belts
   - *c*) Pulleys
   - *d*) Shafts
   - *e*) Other moving parts
2. Elevator safety appliances
   - *a*) Safety door
   - *b*) Shaft guard
3. Benchwork
   - *a*) Careless placement of keen-edge tools
   - *b*) Projecting nails
4. Use of machines
   - *a*) Full speed of machine
   - *b*) Looking around
   - *c*) Holding wood firmly
   - *d*) Turning off power
5. General
   - *a*) Throwing articles
   - *b*) Practical jokes
   - *c*) Care at all times

Hygiene for the worker

1. Health
   - *a*) Food
     - (1) Chewed well
     - (2) Variety
     - (3) No excess
   - *b*) Drink
     - (1) Water
     - (2) Milk
     - (3) Cocoa
     - (4) Tea
     - (5) Coffee
   - *c*) Sleep
     - (1) Amount
     - (2) Fresh night clothes
     - (3) Fresh air
   - *d*) Exercise
     - (1) Deep breathing
     - (2) Walks
     - (3) Games, swimming, etc.
   - *e*) Clothing
     - (1) According to temperature
     - (2) Comfortable
     - (3) Useful
     - (4) Clean
2. Habits
   - *a*) Posture
   - *b*) Smoking
   - *c*) Chewing
   - *d*) Swearing
   - *e*) Evil associates
   - *f*) Tardiness
   - *g*) Recreation
     - (1) Purpose

(2) Amount
h) Stimulants
(1) Alcoholic
(2) Nonalcoholic to excess
3. Cleanliness

a) Skin
b) Hair
c) Teeth
d) Nails

Knowledge of Machinery

A great many things will enter into an instructor's plan for teaching this subject. Some of the more important of these are:

1. The machines in use
2. The type of work done
3. The ages of the students

Other factors may enter into the work in some shops, but in general the following brief outline will cover most of the trade information for machinery.

The name of the machine
1. Purpose
2. Operation
a) How to start
b) Use of guards
c) Ways of holding wood and operation
d) Depth of cut
e) What to avoid
f) How to stop machine
3. History and development of woodworking machines
a) When and where originated
b) Development through improvement

This outline will be applicable to all the machines in the following list except the trimmer and vise.

Most of the machines used in industrial schools are included in the list.

band saw	jointer	lathe
universal saw	bench jointer	grindstone
self-feed ripsaw	sander	trimmer
single surfacer	vertical borer	vise

Knowledge of Tools

There are a great many kinds of tools used in a cabinet-making shop. In order that the student may have a better knowledge of tools, the following classification may be used to emphasize the purpose of the various kinds.

Tools may be classified under eight general divisions.

1. Cutting tools
2. Smoothing tools
3. Boring tools
4. Holding tools
5. Measuring and marking tools
6. Driving and pulling tools
7. Sharpening tools
8. Cleaning and varnishing tools

1. Cutting Tools
a) Chisel
(1) Framing
(2) Mortising
b) Drawknife
c) Gouge
(1) Socket
(2) Tanged
(a) Inside bevel
(b) Outside bevel
d) Saw
(1) Back
(2) Compass
(3) Coping
(4) Hand
(a) Cross-cut
(b) Rip
e) Turning tools
(1) Chisel
(a) Cut-off
(b) Diamond point
(c) Round nose
(d) Skew
(2) Gouge
2. Smoothing Tools
a) Plane
(1) Block
(2) Fore
(3) Jack
(4) Rabbet
(5) Router
(6) Smooth
b) Rasp, or wood file
c) Scraper
(1) Blade
(2) Handled
d) Spokeshave
3. Boring Tools
a) Bit
(1) Auger
(2) Countersink
(3) Drill
(4) Expansive
(5) Gimlet
(6) Plug cutter
(7) Reamer
(8) Screw driver
(9) Twist
b) Brad-awl
4. Holding Tools
a) Bench hook
b) Brace
(1) Common
(2) Breast-drill
(3) Hand-drill
c) Clamp
(1) Eccentric
(2) Screw
d) Handscrew
e) Pincers
f) Pliers
g) Saw vise
5. Measuring and Marking Tools
a) Bench knife
b) Bevel
c) Calipers
(1) Inside
(2) Outside
d) Compass
e) Dividers
f) Gauge
g) Rule
h) Scriber
i) Square
(1) Combination
(2) Steel
(3) Try
6. Drawing and Pulling Tools
a) Hammer
(1) Claw
(2) Sledge
b) Mallet
c) Nail-set
d) Screw driver
7. Sharpening Tools
a) Files
(1) Flat
(2) Triangular
b) Oilstone
(1) Slip stone
(2) Whetstone
8. Cleaning and Varnishing Tools
a) Brush
(1) Bench duster
(2) Glue
(3) Varnish

In addition to the classification of tools, the student's knowledge of tools should cover the following:

Care of tools
1. A place for each
2. Each in its place
3. Care in placing on bench
4. Clean
5. Put away when through

How to sharpen tools
1. Rubbing tool on the stone
2. Rubbing stone on the tool
3. Rubbing slip stone on the tool
4. Grinding only
5. Filing

Knowledge of Stock Materials

First of all the student should know that the term "stock" is used to refer to all articles which are kept on hand in the shop for use in turning out its product. This does not include tools or machines, but only those things which go into the finished product.

The following outline will cover those things which are generally considered stock in the cabinet shop.

1. Lumber
a) Kinds
b) Used for what jobs
c) Where kept
2. Nails
a) Kinds
b) Sizes
c) Where kept
3. Screws
a) Kinds
b) Sizes
c) Where kept
4. Glue
a) How prepared
b) How heated
c) How applied
5. Filler
a) Color desired
b) Condition
c) How applied
6. Stain
a) Color desired
b) Condition
c) How applied
7. Varnish
a) Condition
b) How applied

As all types of wood fasteners may be considered stock, an outline of them may be helpful. This outline overlaps the preceding one in some places, but as it covers wood fasteners, will be given so it may be used supplementary to the other.

Wood Fasteners

A. Nails
1. Materials made of
a) Brass
b) Copper
c) Iron
d) Steel
2. Kinds
a) Brads
b) Flat head
c) Tacks
(1) Flat head
(2) Round head
(3) Double pointed
e) Square head
B. Screws
1. Materials made of
a) Brass
b) Iron
2. Kinds
a) Flat head
b) Round head
c) Oval head
d) Filister head
C. Bolts
1. Kinds
a) Carriage
b) Stove
c) Machine
D. Glue
1. How prepared
2. How heated
3. How applied
E. Dowels
1. Material
2. Sizes
3. How inserted
F. Plates
1. Material
2. Shape
3. How secured
G. Hinges
1. Material
2. Shapes
3. How secured

H. Locks
1. Kinds
2. Where used
3. How secured

Trade Analysis and Special Methods of Work — Joints — Wood Turning

An analysis of the trade is important so that the teacher may instruct the students in the difficult jobs that are frequently encountered in shopwork. A list of jobs that require special knowledge and care follows, arranged alphabetically for purpose of reference.

1. Angle for sharpening planes, chisels, etc.
2. Bandsawing across a large round piece.
3. Bandsawing around a circle.
4. Chamfering around a circle.
5. Disadvantages of using broken handle tools.
6. Driving nails properly.
7. Effect of heat on lumber.
8. Fastening a butt joint.
9. Fastening a miter joint.
10. Filler applications.
11. Glue.
12. Holding large board on bench for planing.
13. Holding large board in vise for edge planing.
14. Lumber.
15. Marking off before cutting.
16. Placing grain in glued pieces to secure strength.
17. Planing a dowel.
18. Planing end grain without breaking out the corners.
19. Planing in proper order for best results.
20. Planing quarter rounds.
21. Planing a surface after sandpapering it.
22. Planing a surface lower than the adjoining surfaces.
23. Planing to the line.
24. Prevent a board from splitting when sawing off a piece.
25. Pulling a nail if the head is off above the surface of the wood.
26. Pulling a nail if the head is off below the surface of the wood.
27. Pulling a nail without disfiguring the surface of the wood.
28. Removing a clinched nail.
29. Removing particles of wood from the rasp.
30. Removing a screw which has half the head off above the surface of the wood.
31. Removing a screw which has half the head off below the surface of the wood.
32. Removing a screw which has the head off above the surface of the wood.
33. Removing a screw which has the head off below the surface of the wood.
34. Removing a screw which turns freely but will not back out.
35. Qualities of lumber.
36. Reading the rule.
37. Sawing to a line.
38. Sawing a small piece (1/16 in.) off the end of a piece.
39. Secret dowels.
40. Selecting the proper joint.
41. Shellac.
42. Smoothing a battered surface.
43. Stain.
44. Starting a screw in hard wood.
45. Starting a screw in soft wood.
46. Testing the edge for straightness.
47. Testing the surface for twist.
48. Tightening round-head screws properly.
49. Varnish.
50. Wood measurements.

Joints

1. Accuracy in construction.
2. Marking off.
3. Kinds:
   - *a*) Butt
     - (1) Doweled butt
   - *b*) Cross lap
   - *c*) Dovetail
     - (1) Half-lap dovetail
   - *d*) Glued
   - *e*) Glued and blocked
   - *f*) Miter
     - (1) Doweled miter
   - *g*) Mortise and tenon
     - (1) Blind mortise and tenon
   - *h*) Tongue and groove

Wood Turning

1. Marking the centers.
2. Position of rest.
3. Speed.
4. Sharp tools.
5. How to hold tools.
6. Use of the calipers.
7. Faceplate turning.

Shop Organization and Management
Avoiding Waste

Every young man who intends to learn a trade should try to become acquainted with the principles which govern business. In order to be of most benefit to his employers, he should understand the various parts of the business, its organization, how the several parts function for the purpose of production. He should have a very definite knowledge of his own place in the business, and the steps which are necessary for him to take to insure advancement.

In order that business may be conducted in an efficient and economical manner, it must be properly organized. Each department must be definitely related to the other departments in order to produce properly.

The organization of a business must of necessity depend upon its size. Each worker should realize that his own work done on a given article must be done right, so that the plant may run smoothly. The raw material is shipped into a plant, work is done on it, and it is shipped out as a finished product. This may, in turn, be used in another plant as raw material; that is, it is not a product ready for use in its final completed state.

Thus products are sent from forests to sawmills, to dry kilns, to planing mills, to furniture factories, to stores and finally to consumers.

The student should understand that in any business there are three essential factors, all of which are important in determining the cost of an article. In these days of keen competition the cost is an important item.

The three factors are material, labor, and overhead expense. The average worker can easily understand that the material upon which he works must be purchased, also he knows that the work that is put on it must be paid for. The last factor, overhead expense, which is of equal importance with the others, he may not fully understand.

Overhead expense may perhaps be defined as "All expense incurred by a plant other than cost of materials and labor done directly on the product." Let us enumerate some items which may properly come under this heading:

1. Office force salaries.
2. Those necessary to direct in the shops.
3. Inspectors.
4. Packers and shippers.
5. Cost of issuing stock and organizing.
6. Costs of office furniture.
7. Costs of wear of machinery.
8. Cost of buildings and ground.
9. Power.
10. Heat.
11. Light.
12. Janitor service.
13. Taxes.
14. Interest.
15. Insurance.
16. Repairs.

It will be readily seen that in some plants where the overhead is necessarily high, just a little waste on the part of a worker may materially handicap a concern, or even cause a loss in operating expense.

In many plants the personnel of the administrative force is too large, causing a greater outlay in salaries than the number of producing workers would warrant.

A brief outline of plant officers is here shown, in their administrative order.

General Manager	Assistant Foreman	President
Superintendent	Stockholders	Vice-President
Foreman	Board of Directors	

The matter of avoiding waste is very important to every shop, also to the worker. He should devote some time to consideration of avoiding waste of *material* and *time*. Accuracy and sharp tools are necessary in order that this might be accomplished.

The Shop Product — Furniture Finishing

In addition to learning how to avoid waste, and properly fit himself into the organization in which he is employed, it is very helpful for a worker to learn something about the shop product.

Information concerning this may be secured by considering the distribution and the consumption of the product.

Because of the fact that most production plants are located in thickly populated communities on account of the necessity for labor, it also becomes necessary that the shop product

shall be transported by some means or other, to the consumer.

The main transportation link between the producer and consumer is the railroad. Much of our present-day transportation is done by motor trucks, but however it is done, the distribution must be sure, or the producer will find it necessary to stop manufacturing, on account of having too much of his product on hand, and too much capital invested at one time.

Goods are shipped to all localities, and it will be easily understood that failure to have adequate transportation would result in the need of commodities to the affected areas.

The amount of business done by a firm must depend on the consumption or demand for the product. Inefficient transportation will affect the output of a factory, so also will poor workmanship on the product. Consumers expect full value for their money, and if a poor quality article is produced, the demand for the article will lessen, causing men to be put out of work.

Business will be poor if men are out of work, and poor business tends to reduce buying on the part of merchants, which in turn lessens production.

Business is not produced by great masters of finance. They help to facilitate production and sales, but business depends upon the needs and wants of the consumer.

The teacher will want to discuss and illustrate different methods of wood finishing to help the students understand, so they can plan their own wood finishing.

A short outline is given here to suggest lines of thought for the various processes.

1. Sandpapering
2. Filling:
   - *a*) Use of filler
   - *b*) Putty
   - *c*) Plastic wood
   - *d*) Crack filler
   - *e*) Shellac
3. Staining:
   - *a*) Natural wood color
   - *b*) Other than natural wood color
4. Lacquering
5. Enameling
6. Painting
7. Shellacking
8. Varnishing
9. Polishing:
   - *a*) Sandpaper
   - *b*) Pumice stone
   - *c*) Steel wool

Reviving Indian Arts and Crafts

B. H. Van Oot

State Supervisor of Trade and Industrial Education, Richmond, Virginia

A story of how the white man has been instrumental in assisting an Indian tribe in reviving its ancient arts and crafts work, thereby providing beneficial activity and increasing the tribal income.

THE Pamunkey Indians reside on a small reservation in King William County, Virginia. This tribe, once very powerful, numbers among its ancestors such notable individuals as Pocahontas whom every schoolboy knows, Chief Powhatan who was the colonists' real friend, Chief Opechancanough who headed the Jamestown massacre in 1644, and Chief Nectowance, who was responsible for bringing about peace between the colonists and the Indians. The descendants of this tribe of Indians, about two hundred in number, gain a rather meager subsistence from hunting, fishing, and farming. The returns from these three forms of subsistence have lessened during the past few years, and therefore the Indians have been compelled to find some new sources of income.

The plight of the Pamunkey Indians was observed by the state supervisor of trade and industrial education during a visit to the reservation for the purpose of making a commencement address to the children who were finishing their public-school career — the completion of the seventh grade. He observed the strong physiques, the keen interests, the Indian relics, the primitive but intensely interesting decorations in the furnishing of the homes, the ornamentations on the costumes, the handicrafts of the older men and women, and the eagerness with which the Indians listened to the short address which centered around the arts, crafts, traditions, and ideals of western Indians with whom the speaker had lived for several months, and also around an experiment which some interested persons conducted in the congested sections of the city of Boston which gave birth to the S. E. G. (Saturday Evening Girls) Pottery and to the Paul Revere Pottery now being manufactured on a large scale. He noted especially that the simple handicraft work of the children in the reservation school displayed art and craft abilities that could be developed if the necessary encouragement were given to the children.

The idea of encouraging the Indians to capitalize on their inherent skills, ideals, customs, and traditions was presented to the assembled tribe and was enthusiastically received. The State of Virginia immediately employed Mr. W. E. Ross, an expert potterer and industrial artist who had been a keen student of Indian life, and intrusted him with the supervision of erecting and equipping a suitable pottery building with funds provided by the state. While the building was being erected by the Indian labor available on the reservation, Mr. Ross made an intensive study of the Indian arts and crafts, their language, customs, traditions, and history, and collected or reconstructed a series of designs, symbols, panels, and friezes suitable for application to pottery. In less than three months after the idea was originated, the Indians were making pottery, and true to Indian traditions, the women folk were doing the work. The results of this project promise a flourishing industry which will not only provide sufficient revenue to support these depressed people but which will add new interest to Indian life which eventually will be capitalized by the elementary public-school teachers when they teach their children about the Indians.

The clay from which the pottery is made is taken from clay beds which have lain unused for a hundred years or more but from which the forefathers of the present tribe made the earlier pottery. It burns at a low temperature into a rich dark-tan color that commercial manufacturers try to imitate by artificially coloring inferior grades of clay. The outside of the pottery is left unglazed, but the inside is either glazed, if the article is to be subjected to heat, or made waterproof by an original Indian process if the article is to be used as a container of cold liquids.

The designs used for decorating the pottery are for the most part typical of the local environment. These were secured through a careful study of pieces of pottery in national and local museums, through copying motifs found on pottery in the homes of the Indians, and through books and other literature which give accounts of the arts and crafts of the Eastern tribes. Some designs are original but typical of Indian life. Among the most original and interesting are the creation of trays and bowls upon which appear conventionalized de-

signs in which the turtle, the frog, or the fish are used as a motif for design, and those which portray interesting events in the history of the tribe.

Almost everyone is familiar with the story of Pocahontas and Captain John Smith. The Indians have told this story in their own language in a frieze which borders some of their bowls. The reader is made familiar with the Indian hieroglyphics used in telling this story in the following cut.

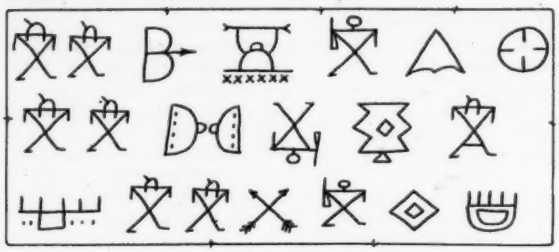


Fig. 1. The story of Pocahontas and Captain John Smith hieroglyphically represented

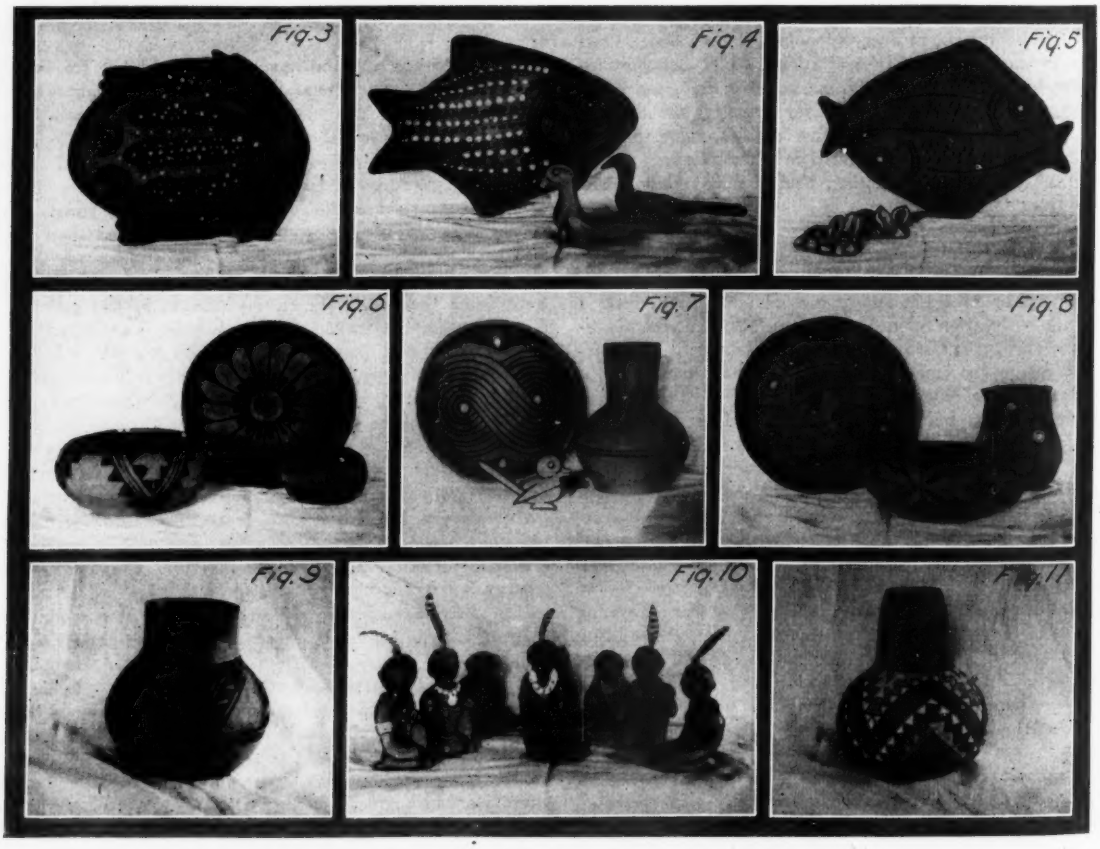
Translated this story reads: *Indians* while *hunting discover white man standing* in *shallow water. Indians agree* to *make dead white man* at *Indian Chief's seat. Indian maiden disagrees* with *Indian men* and *wishes no harm* for *white man* but *best wishes* and *good luck.* (The words in italics are the interpretations of the Indian symbols in the order of occurrence.)

What a thrill the white children in the public schools would get if they could write a simple story in the original Indian language, and what an interesting approach to the teaching of the life of the Indian if the teacher should start by drawing these symbols on the blackboard for her children to read!

Another story used as a frieze has an interesting historical background that makes the inscription have present-day significance. In 1640 there lived an Indian chief named Powhatan who was friendly with the white settlers. In 1640 Chief Powhatan died and was succeeded by Chief Opechancanough who was not so friendly to the white people. In 1644 he headed a terrible massacre of the white settlers but was captured and put in prison at Jamestown. One of the guards was so angry about the deeds of Chief Opechancanough that he shot and killed the chief. The next chief, Nectowance, signed a treaty of peace with the white people. By the terms of this treaty the Indians were given all the land between the James and York Rivers from the falls of each to the Kequotan and were guaranteed permanent protection by the white man. In return for this protection, the Indians were required to present badger skins to the representative of the King (English) each year at the "going away of the geese." If the reader happens to be in Richmond, Virginia, on any Thanksgiving Day, he will see the whole tribe of Pamunkey Indians travel to Richmond to present wild game to the governor of the state in compliance with the terms of the treaty signed in 1660. The story of this ceremony is reproduced in Figure 2.

The story reads as follows: *On a given date* which is *the flying away of the geese* the *Indians make tracts* (goes on the trail) to *meet the white man.* With *similar intentions* they *agree* to *smoke the pipe of peace* and *give treaty furs* in *fulfillment of terms of treaty* and give *good luck* and *best wishes* to *one another.*

Designs which are copies of those taken from pieces of



Figs. 3, 4, and 5 are trays used for serving fruit and wild game

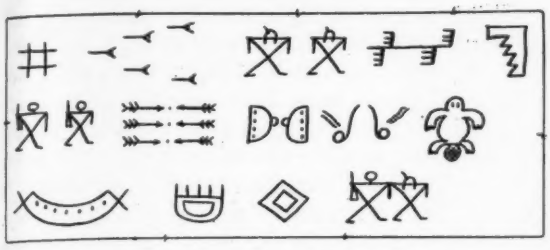


Fig. 2. The treaty of peace signed by Chief Nectowance in 1660

pottery found on the reservation or copied from originals in Eastern museums are used in conventionalizing the forms of life found on the reservation such as the turtle, the fish, and the frog.

Although the Pamunkey Indians have been making pottery only one year, yet they have developed a creditable market for the same. Sales have been made at schools, at teachers' meetings, at the Valentine Museum, at souvenir stores, at the annual Pow-Wow, to visitors at the reservation, and by correspondence.

The development of the pottery industry among the Pamunkey Indians is suggestive of a broader field for the activities of the industrial-arts teacher. In every group of people in any given community there exists inherent or potential talents which the industrial-arts teacher could develop if he would extend his efforts beyond the classroom. He is about the only person in a strategic position to capitalize on the arts, ideals, traditions, and customs that have fallen into decadence among the several types of people in America such as the mountain folk or the people who compose our foreign settlements. In doing so he will not only be rendering those people a valuable service by helping them to develop their own potential abilities but will be rendering society a valuable service by developing types of arts and crafts which will be typically American.

Fig. 12. Chief Manatawopp who regularly attends the pottery class. — Figs. 13 and 14. Indian Maidens in native costume displaying their work. — Fig. 15. This squaw takes her pottery quite seriously. The proceeds derived from its sale are her only income

Wood Carving — VII

J. I. Sowers

Director of Industrial Arts,
Miami, Florida

This is the seventh and final article in the series on wood carving as adapted to industrial-arts work.

WE HAVE arrived at the end of the present series of articles on wood carving as adapted to school industrial-arts work. It has been a surprise and also a matter of gratification to learn of the interest these articles have aroused in this very old and, in this country, almost forgotten art.

Interest in these articles has appeared from three distinctly different sources, as evidenced by letters received: these are (1) teachers who want to add this feature of art, and interest, to their work; (2) persons who have taken up fine craftwork as an occupation for their leisure; and (3) persons interested in the home-industries movement.

With the first two of these groups we are familiar, but the third group represents a comparatively new departure in American life, so much so that it seems important to say a few words about it.

This movement is known under different names as "Homecraft Guild," "Arts and Crafts League," "Mountain Industries," and "Fireside Occupations." For some years this movement was represented largely by groups of folk in the mountains of North Carolina, who had continued, in spite of the machine age, to turn out fine handmade, hand-wrought things in their fireside occupations. To own one or more of these fine pieces of hammered copper, spun silver or pewter, fine blankets (hand woven and dyed with hedge-row dyes), colorful rugs, or handmade and hand-carved mountain furniture, is a matter of pride in many homes. Today these handicraft guilds have centers in a number of states outside of the South — folk in New England, Pennsylvania, the Virginias, California and other sections have come to realize the satisfaction and the profit to be derived from making and selling beautiful handwork. Within the past few months the legislature of New York has been asked for a subsidy to be used

by the state education department to organize and train for handicraft occupations on a state-wide basis. New Hampshire is offering this work in one of her teacher-training schools this summer, the course being outlined by the leaders of the handicraft guilds of the state. A visit to these homecraft shops is a revelation to one unacquainted with the growth of this movement, and with the beauty and art that is built into these products by patient and largely hand methods of work.

A New Renaissance

There can be little doubt that the period in which we are now living is but another stage of the Industrial Revolution which began in England at the turn of the last century. The advent of the machine began a new era in our economic history, but while the world became richer in money and in goods, it at the same time became poorer in art, especially so in the plastic arts. At the beginning of the nineteenth century the machine, having got fairly under way, began to displace the beautiful handicraft work of the past with articles adapted to machine production. Beautiful forms of decoration in architecture and in furnishings, formerly the work of artistic handicraft, gave away to mass production. The steady introduction of labor-saving machines began to appear in all lines of production, and the artisan, discarding the tools of his trade, became the tender of the machine.

This period brought on a disruption of the arts which were mothered by the architecture of the past. Under handicraft methods, the knowledge necessary to production in the arts is handed down from father to son, or from master to apprentice. In this development the artist, and the designer, is also the workman. There is no divorcing of art on the one hand and craftsmanship on the other — the two develop together. The machine soon broke up this traditional development of art and handicraft. In the transition that followed, the appreciation of fine lines, appropriate design, and balance, does not necessarily form a part of the equipment of the workman.

Previous to the Industrial Revolution the arts flourished naturally, and as a matter of course, in the life of the nations, each nation or people having its own traditional expression. Man made things out of necessity for use, and he made them as beautiful as he was able, for his enjoyment. The decoration of the common objects of his environment extends as far back as we have either history or tradition in the existence of man. Since there is in this development no line of demarcation between art and craftsmanship, it is very evident that they grew up together.

While we deplore the lack of art in the machine age, we cannot help but recognize the machine as the economic savior of man who was no longer able to meet the demands for production without its aid. We also recognize that the machine by multiplying production has increased leisure, and in so doing may bring back to us once more the possibilities of a new renaissance of art in man's use of his leisure. The multiplicity and the cleverness of the machine must produce the necessities to meet the demands of modern life. No handwork could supply them. Man, with the newly made leisure of this age, may again build a new age of art. There is strong evidence of this in the arts-and-crafts movement, as a leisure-time occupation, which is spreading over all countries with surprising rapidity.

When man took up the oil can, the wrench, and the hammer, and became a machine tender, he stepped out of his age-old environment into a new and an unnatural stage of the world's history. Knowing nothing of the finished product on which he performed an infinitesimal operation as it passed him on a moving production line, he shifted from the work to the pay check. It is natural, however, for man to be interested in his work and to make of it a means of expression; and as soon as the machine by its increased production made leisure possible, we again see men everywhere turning to the arts and crafts for natural stimulation in their leisure time. With the existence of opportunity for self-expression through the arts (providentially provided by the machine) it is but natural that man, becoming tired of his new toys — the motion picture, the radio, the automobile, etc. — should turn again to those old arts which were lost in the early stages of industrialism, and find in them increased satisfactions.

The schools by their teaching of industrial arts have created by this a new generation that turns naturally and easily to the arts when opportunity offers.

Wood Carving an Art

Wood carving is, of course, an art subject, and in this, as in all arts, the ability of accomplishment lies more in close observation and intelligent practice, than in any amount of book instruction. One never goes very far in any art unless he finds joy in doing it. Art is the expression of man's joy in his work. Wood carving offers a release to man's creative instinct, and to his desire for the expression of himself in his work. Wood carving soon begins to take on an individuality just as does one's handwriting. This art differs from some of the other arts in that it contributes directly not to the artistic sense alone, but to the needs and use of physical life. The first exhibition of man's spiritual life was expressed in his desire for beauty. It was out of this attempt to catch, hold, and capture beauty that the arts were born. It is the struggle for beauty that has made an art out of living.

The designs and suggestions given in the articles that have comprised this series, were, of course, limited to the space possible to devote to it in a magazine, and were intended only to arouse and interest, and give a start in this subject. The designs given were also limited to the kind and nature of the carving presented in each article, as, for instance, under *incised carving*, in the first article, was given a method of work and a series of designs which are not beyond the boy in the seventh grade of junior-high-school work. Later articles

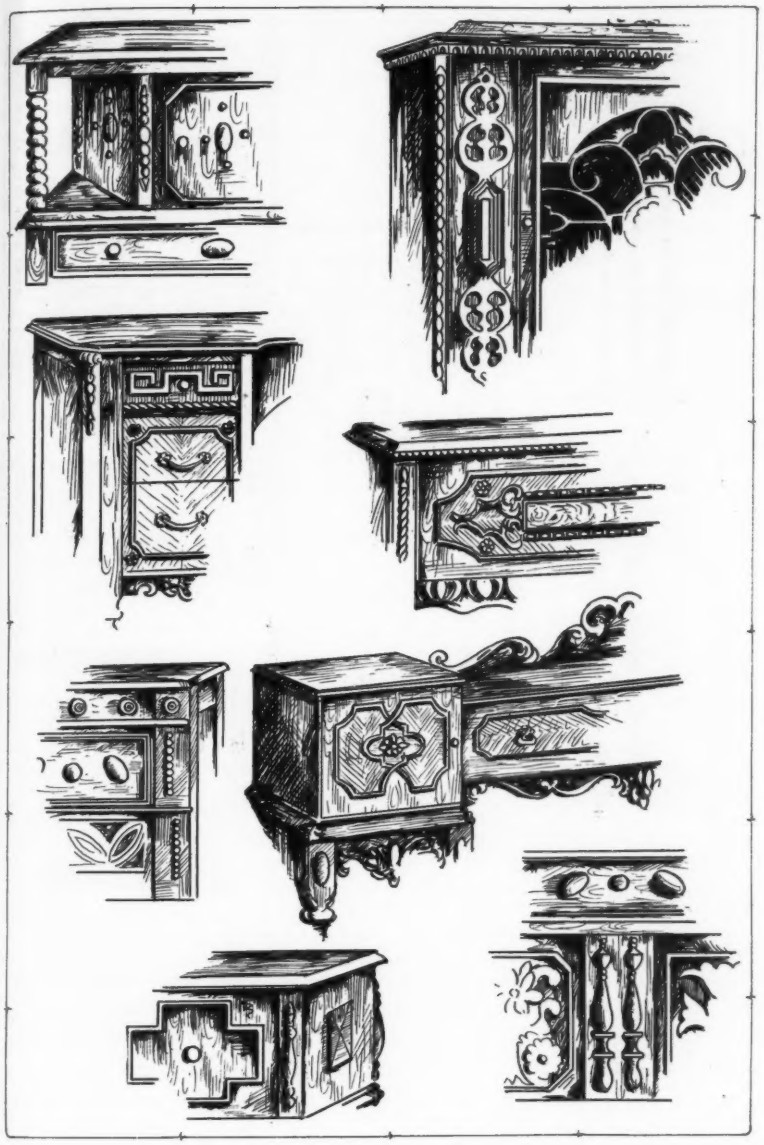


Fig. 35. Examples of machine decoration

have given an easy gradation of work up to rather fine examples of school-craft work.

In Figure 35 some examples of decoration that are a result of the age of machine production are given. These decorations are not a natural part of the pieces on which they are applied. The ornaments are machine made, of wood or a composition material, and are glued or bradded to the pieces they are supposed to decorate. In architecture, or in some forms of built-in furniture, such forms of decoration are not in such bad taste as they are on the articles of furniture by which one is surrounded, and which are subject to our own choice, discretion, and judgment, and which reflect our culture.

As a further illustration of the value of craftsmanship in school-shop production, Figure 36 is given. This is a seaman's chest, for which the designs were worked out by one of our senior-high-school students. It is constructed of solid oak, and the project is an excellent piece of student work. It is not so interesting nor so perfect in design as some of our student work on pieces that have been carved from designs supplied by old masterpieces, but it does represent what a young American can do when he turns to making a beautiful chest. Attention is called to the large sea shell which is carved on the ends, and which is so worked out as to form the handles of the chest.

Of course, in carving in wood, ultimate success and fine ability are more than a matter of skilled workmanship. Carving must be an *enrichment of construction* — not an afterthought, but an integral part of the whole. It should not be applied after construction. Problems of ornament and problems of construction must be solved together. Note in the sea chest how it is evident that this has been done.

Taste and discretion in art are an elusive thing which defies formation into exact statement, yet for our guidance there are certain principles which will aid us in developing the quality of appreciation. These may be grouped under four headings, as follows:

1. The material of which an object is made as well as the use to which it is to be put should determine its form.
2. The structure of an object must control its design.
3. Ornament if used upon an article should emphasize its structure.
4. When an ornament is derived from nature, it must be conventionalized.

As an example of some of the above principles, let us take, for instance, the metal bed (see Fig. 37). Many readers, no doubt, still recall the first designs of metal beds, which were made to follow such elaborate floral motifs as those shown at A and B. Iron as a material does not at all suggest its use in running vines, wreaths, and flowers. When public taste would no longer tolerate beds made of this material in such incongruous designs, wood beds began to come back into popular favor. Then the metal-bed maker, with his ear to the ground for a market for his product, sent out S.O.S.

signs to his designers, and metal beds appeared in clever imitations of wood beds, as seen at C, D, and E. These metal beds were not only made in imitation of the popular wood beds of the time, but also after the old masters of furniture design, known as *period styles;* and might be had in any *wood* finish, as walnut, mahogany, bird's-eye maple, etc. It was only by thumping these beds that one discovered that they were not actually wood. More recently makers of metal beds are adapting the design of the bed to the material of which it is made, as at F and G. The modern types of metal beds are beautiful, because the designs are now for the first time adapted to the material from which they are made — they are frankly metal beds, meeting in the simplest and most direct way the structural needs of a bed, and in designs adapted to the material used. These beds suggest in every line the *strength* of iron which is its dominant quality as a material. The structural lines of the beds and such ornament as is used tend to develop further the motif suggested by the materials and purpose.

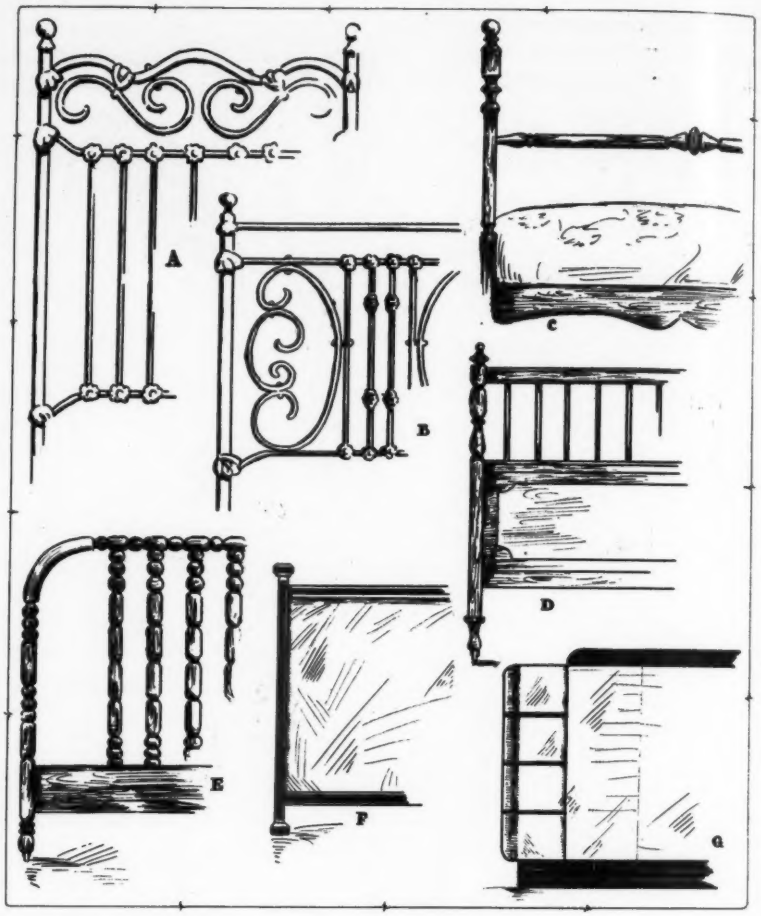


Fig. 37. Growth of metal bed design

The state of the public mind is such that when one speaks of art the thought is at once of painting and sculpture, but these other things — chairs, tables, dishes, silver, houses, city streets, parks, cloth — cannot possibly be art. As teachers of woodcraft which has so long had for its major objective "tool technique" is it not time that we too begin to seek to add to our work that other and higher quality which makes it beautiful, and more satisfying in use?

Fig. 36. A seaman's chest by a senior high-school student

Men have apparently produced numerous articles to serve their needs, yet these may be grouped under a few heads, the shelter, chair, table, bowl, etc., all of these are shaped according to their use, and are much the same in all countries and in all the ages past. The difference consists in the state of civilization under which they were produced and accounts for the artistic quality that they possess. As has been suggested early in this article, we have now apparently arrived at the dawn of a new age, in which if the schools do their part, and recognize their obligation, a new renaissance of

art may be possible. Wood carving, and its twin art, sculpture, is not only the oldest but the most natural of the arts. For untold ages early man sought to express himself in mud, on the sands, on the rocks of his cave home, on his tools and implements of domestic use, and on the weapons of the chase, by carving figures of his gods, animals, and the things by which he was surrounded and by which his life was conditioned. A child with a pat of mud, a boy carving a cake of soap in kindergarten, a pupil in the wood shop carving in wood, each do these things with surprising ease with little instruction, perhaps, who knows, from an age-old longing for expression still dominant in the race.

The Hobby and Peace of Mind

Max Chambers

Public Schools, Federalsburg, Maryland

In this third article on hobbies, the author is indicating the need for the school to further a movement which is becoming more and more necessary in modern life.

DID you ever watch a kitten tangle the yarn, a dog chase a cat, a whale sport, a mule kick, and a man take a fling? Well, they were just relaxing — doing things they especially liked. Human beings are especially susceptible to temptations, both good and bad. Some choose wrongly but others naturally turn to creative effort for which they have talents. Expression usually manifests itself in the character of one's choices of activity or diversion. This is what is called one's hobby. Every person who has a hobby is looking to obtain peace of mind through it. In other words, he is seeking for happiness.

Where there used to be a few hobbies, there are now hundreds. With shorter work periods, many are finding great joy in collecting or creating during their leisure hours. Every one of us must have some small enthusiasm in which to lose himself, and we must be gainfully occupied if we want to grow. One hobby serves its purpose as well as another, and all of them have the same aim — to provide an outlet.

Hobbies can be divided into two separate classes. The purpose of the first is escape, usually satisfied by engaging in, or in some way following, games and sports. This type probably has the most followers. The second class has a creative aim, and its devotees are collectors, inventors, and craftsmen. This type is confined to the minority who strive to increase their usefulness or to make something new to meet a social need, or to create for their own satisfaction. Each hobbyist, however, looks for the praise and approval of the group or community in which he moves. Man craves for social approval.

This high-powered, fast-moving life of ours is reeking with the monotony of repetition. Its main disease is ennui. The automatic machine with its specialization, has taken away from the worker the joy and pride of accomplishment that was once the artisan's gateway to peace of mind. The early craftsman loved his work because in it he found constant variety, satisfaction, praise, and happiness. Some of the modern, wide-awake employers are aware of the unrest produced by monotony, and are taking steps to devise ways and means to break the tiresome routine to which the worker is subjected.

While the boss and the executive go on extended vacation trips in order to forget the shop, the worker finds relief and joy in his stamp or match-box collection, or in the model ship which he has fashioned out of salvaged material.

A search of the avocational activities in American schools up to now brings to light only one instance of permanent recognition of the sociological importance of avocations and this was instituted by a woman of broad vision. In the New Hill School at Pottstown, Pennsylvania, there is a large special room known as Hobby Hall. It is being filled with permanent exhibits that boys and girls may see, choose, and find a guiding influence to a full, useful, and happy life. Some clubs are advocating hobbies as a definite part of their programs with the hope that the boy may, through avocational endeavor, find a definite life interest. Hobby Fairs in schools are becoming more popular with each semester.

Henry Ford says, "A man may be out of hire but not necessarily unemployed," and Angelo Patri, America's child expert, says, "A hobby is essential to the complete growth of boys and girls because it offers opportunity for self-expression in a healthy way. In these days of intense effort to make a living, by whatever means at hand, the hobby offers a liberation of spirit that is absolutely essential to the healthy physical and mental development of children." Mr. Patri has several hobbies — books, golf, art, and dogs among them.

The next few years will probably see some legislative action sponsoring the movement, though legislation might breed an attitude of indifference and shorter hours might lead to overcommercialization. It is time that the school show more interest in the subject.

High-School Shop Teachers

Harry E. Bolle

Deerfield Shields High School, Highland Park, Illinois

A continuation of this article from page 227, July 1934 issue of this magazine.

The most frequently taught subject is mechanical drawing. Table IX shows that 99 teachers teach one subject only. Of the 99 teachers teaching one subject, 30 teach drawing; 17 teach printing; and farther down the table we note carpentry, weaving, and aëronautics being taught once each as a single subject. It will be noted that the Vocational Group has been omitted in Tables VIII to XIII, inclusive.

Tables X, XI, and XII show the two-, three-, and four-subject combinations found.

Table XIV gives the number and percentage of teachers in

each group distributed according to the use of textbooks and instructional devices. It is interesting to note that nearly 70 per cent use a textbook in teaching industrial arts in Illinois. The use of job sheets, instruction, and information sheets is also significant.

TABLE IX

Number of Teachers Teaching One Subject

Subject	Group I	Group II	Group III	Group IV	Group V	All Groups	Per Cent
Mechanical Drawing	1		4	3	22	30	30.3
Printing		1	4	1	11	17	17.2
Auto Mechanics		2	2	3	5	12	12.
Electrical Work			1	1	8	10	10.
Machine Shop			2	2	5	9	9.1
Elem. Bench (Woodwork)	1	2	2		2	7	7.1
Cabinetmaking				2	1	3	3.
Wood Turning				2	1	3	3.
Patternmaking					3	3	3.
Forging	1					1	1.
Carpentry					1	1	1.
Reed Weaving					1	1	1.
Aeronautics					2	2	2.
Totals	3	5	15	14	62	99	

With regard to the teacher preparation, the study shows that 346 teachers had earned 12,861 semester hours of credit in school since beginning to teach. This is 3.7 semester hours per person. The total hours earned by extension work for all the groups is 2,488 hours, or 19.3 per cent of the total. The largest number of hours was earned through work taken at summer sessions — a total of 7,123 hours, or 55.4 per cent of the total earned. Work taken during the regular year made up 3,250 or 25.2 per cent of the total hours earned.

Table XV gives the number and percentage of teachers in the various groups who had attended summer sessions within a five-year period — beginning with the summer of 1926 and including the summer of 1930. Two hundred and sixteen teachers (45.5 per cent) did not attend a summer session during any of the five summers. In Group I, a large number who did not attend summer school indicated that they worked on farms. In the Vocational Group many worked at their trade, while in Group IV, and especially V, many indicated teaching summer school.

We find as high as 5.7 per cent of all teachers attending all five summer sessions. The 14.1 per cent who attended either four or five summers were in most cases working toward their first degree.

Some schools insist that teachers attend school at least once every third summer. From the data given in the table, one can readily see why boards of education pass such a ruling.

The number of professional and other magazines read regularly by the teachers in each group is given in Table XVII. One hundred and eighty-five teachers (43.4 per cent) read two magazines a month. Eighty teachers (18.8 per cent) read three magazines. and 33 teachers (10.9 per cent) read four or more magazines each month.

We find in Table XVII that 351 teachers (85.2 per cent of all the teachers) read the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine, while 260 (63.1 per cent) read the *Industrial Education Magazine*.

In Group IV four teachers, and in Group V twelve teachers, did not read any professional magazines, belonged to no professional asso-

TABLE X

Two-Subject Combinations and the Frequency With Which They Occur

Academic Subjects	Aeronautics	Architectural Drawing	Art Metal	Auto Mechanics	Cabinetmaking	Carpentry	Electrical Work	Elem. Bench (Woodwork)	Free-Hand Drawing	General Shop	History of Architecture	Home Mechanics	Machine Drawing	Machine Shop	Mechanical Drawing	Patternmaking	Printing	Sheet Metal	Wood Finishing	Wood Turning	Frequency
		X						X							X						31
															X						23
X															X						8
X																	X				5
								X										X			4
X								X													4
													X		X			X			5
X							X			X											5
					X										X						2
		X								X					X						2
		X						X									X				2
	X			X													X				2
			X	X											X						1
							X								X						1
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		X						X									X				1
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				X																	1
				X								X									1
																			X		1
																		X			1
			X							X											1
X						X			X											X	1
X																	X				1

TABLE XI

Three-Subject Combinations, and the Frequency With Which They Occur

Academic Subjects	Architectural Drawing	Auto Mechanics	Cabinetmaking	Carpentry	Electrical Work	Elem. Bench (Woodwork)	Forging	Foundry	Free-Hand Drawing	General Shop	History of Architecture	Home Mechanics	Machine Drawing	Machine Shop	Mechanical Drawing	Patternmaking	Printing	Sheet Metal	Sign Painting	Stagecraft	Wood Finishing	Wood Turning	Frequency
X						X									X								22
			X			X									X								19
	X					X									X								15
X	X														X								7
	X								X						X								6
	X		X												X								4
	X														X		X						2
X															X						X		1
X	X		X																				1
X										X					X								1
X						X												X					1
			X												X						X	X	1
		X	X																				1
			X		X																		1
			X			X				X													1
			X	X		X																	1
			X			X															X		1
						X						X	X		X								1
	X									X													1
			X							X											X	X	1
															X						X		1
																							1
				X	X																		1
				X																			1
					X	X																	1
						X						X								X			1
	X						X								X								1
	X										X				X								1
	X								X		X												1
X						X																	1
												X			X								1

TABLE XII

Four-Subject Combinations and the Frequency With Which They Occur

Academic Subjects	Architectural Drawing	Art Metal	Auto Mechanics	Cabinetmaking	Carpentry	Electrical Work	Elem. Bench (Woodwork)	Forging	Free-Hand Drawing	General Shop	Home Mechanics	Machine Drawing	Mechanical Drawing	Patternmaking	Printing	Reed Weaving	Sheet Metal	Wood Finishing	Wood Turning	Frequency
x				x			x						x							8
x							x						x					x		4
	x			x	x		x						x							4
	x			x			x						x							4
x	x						x						x							3
	x		x				x						x							2
	x						x			x			x							2
	x			x								x	x							2
				x			x											x	x	2
x				x						x										1
x							x	x					x							1
				x			x					x	x							1
x	x												x						x	1
x							x			x			x							1
				x									x						x	1
	x						x	x					x							1
	x								x			x	x							1
							x						x		x				x	1
	x				x		x						x							1
							x			x	x		x							1
	x			x			x						x						x	1
		x					x						x		x					1
							x	x					x	x					x	1
				x				x			x						x			1
				x	x		x						x						x	1
x						x	x						x							1
				x			x	x						x						1
				x			x						x		x					1

tively small number, engage in no extracurricular activity. These constitute 27.5 per cent of the entire group and some teachers participate in as many as four activities, which is undoubtedly more than they are capable

TABLE XIII

The Number of Teachers Teaching Various Subjects

Subjects	All	1 Subject	2-Subject Combination	3-Subject Combination	4-Subject Combination	5-Subject Combination	6-Subject Combination
Mechanical Drawing	285	30	79	93	43	29	9
Elem. Bench (Woodwork)	200	7	35	73	44	29	12
Architectural Drawing	114		36	40	18	16	4
Cabinetmaking	100	3	5	34	28	19	11
Academic Subjects	99		23	35	20	16	5
Printing	32	17	10	3	1	1	
Carpentry	29	1	2	6	6	9	5
General Shop	28		4	5	5	9	5
Auto Mechanics	27	12	6	4	2	3	
Wood Turning	27	3	2	4	8	10	
Wood Finishing	23		5	3	6	4	5
Electrical Work	22	10	6	1	1	2	2
Patternmaking	20	3	1	7	2	4	3
Home Mechanics	19		1	3	2	8	5
Machine Shop	16	9	2	1	-	3	1
Machine Drawing	15		4	3	4	2	-
Forging	11	2	-	2	5	2	-
Free-Hand Drawing	11		2	8	1		
Sheet Metal	8		3	1	1	2	1
Reed Weaving	3	1			2		
Art Metal	3		2		1		
Aeronautics	3	1	2				
Foundry	2			1		1	
Radio	1			1			
Sign Painting	1			1			
History of Architecture	1		1				
Stagecraft	1			1			

TABLE XIV

The Number and Percentage of Teachers in Each Group Distributed According to the Use of Textbooks and Instructional Devices

	Voc. Group		Group I		Group II		Group III		Group IV		Group V		All Groups	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Textbooks	31	68.9	61	65.6	47	68.1	44	62.	15	48.4	95	87.2	292	69.9
Job Sheets	26	57.8	42	45.2	33	47.8	30	42.3	11	35.5	54	49.5	196	46.9
Instruction Sheets	28	62.2	31	33.3	33	47.8	34	47.9	15	48.4	61	55.8	202	48.3
Information Sheets	28	62.2	28	30.1	31	44.9	29	40.8	15	48.4	40	36.7	171	40.9
Another Plan	21	46.7	12	12.9	9	13.	18	25.4	15	48.4	8	7.3	55	13.2
Totals	45	....	93	....	69	....	71	....	31	....	109	....	418	....

TABLE XV

The Number of Summer Sessions Attended by the Teachers in the Various Groups Between 1926 and 1930 Inclusive

No. of Summers Attended	Voc. Group		Group I		Group II		Group III		Group IV		Group V		All Groups	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
5 Summers	5	11.1	4	4.2	7	10.	1	1.3	4	10.5	6	4.2	27	5.7
4 Summers	2	4.4	7	7.5	8	11.4	14	18.9	3	7.9	6	4.2	40	8.4
3 Summers	3	6.7	9	9.4	9	12.9	9	12.2	5	13.2	4	2.8	39	8.2
2 Summers	8	17.8	20	20.8	15	21.4	11	14.9	5	13.2	23	16.2	82	17.3
1 Summer	2	4.4	19	19.8	13	18.6	13	17.6	4	10.5	20	14.1	71	14.9
None	25	55.6	37	38.5	18	25.7	26	35.1	17	44.7	83	58.5	216	45.5
Total Replies	45	....	96	....	70	....	74	....	38	....	142	....	475	....

ciations, and had attended no summer sessions for five years. Sixteen teachers (3.9 per cent) in all groups showed a decided lack of interest in self-improvement.

Forty-nine and one-tenth per cent of all the teachers were members of the Illinois Vocational Association, and 53.4 per cent were members of the National Education Association.

The question whether industrial-arts work was elective or compulsory was asked of the teachers. In considering all the groups, as a whole, 310 teachers (67.2 per cent) indicated that the work was elective, and 116 teachers (25.2 per cent) said it was compulsory if the technical course was taken. Only 35 teachers (7.6 per cent) asserted that it was compulsory in the ninth grade.

Teachers who can assist with extracurricular activities are, no doubt, in greater demand than those who are able only to teach regular classwork. An attempt was made to find the number of industrial-arts teachers engaged in outside activities and the number of such activities for which they are responsible.

Table XVIII gives the numbers and percentages of teachers in each group engaged in the several numbers of extracurricular activities. One hundred and thirty teachers, a comparative of doing well in many instances. This number of teachers is relatively small, however; likewise the number who engage in three activities is small.

Athletics is, obviously, the most popular school activity. Over 50 per cent of the teachers engaged in extracurricular activities are assisting with some form or another of athletic work, but we find as the school becomes larger, fewer men are engaged in coaching.

The amount of time spent in extracurricular activities in minutes per week by 236 teachers is given in Table XIX. Some teachers spend but a few minutes a week, while we find one individual spending 19 hours a week in extracurricular work. One hundred and seventy-six minutes a week is the median amount of time spent by all the groups in extracurricular activities. Twenty-five per cent spend 83 minutes or less each week, while 25 per cent spend 381 minutes or more. In general, the teacher in the small city spends more time outside of the regular school day in extracurricular activities than does the teacher in the larger cities.

Summary and Conclusions

In general, the industrial-arts teachers in the State of Illinois are well prepared to teach their work. A large number

hold degrees, and the majority of the teachers have had contact with the trades or with some form of industrial work; this contact appears to provide a desirable part of the preparation of industrial-arts teachers.

As the city increases in size there is a marked tendency to employ more mature teachers; likewise the salary, and the numbers of years' contact with industry, as well as the years of teaching experience are greater in large than in small cities.

TABLE XVI

The Number and Percentage of Magazines Which Teachers in the Various Groups Read

Magazines Read	Voc. Group		Group I		Group II		Group III		Group IV		Group V		All Groups	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1 Magazine	11	26.2	30	31.9	17	25.4	16	20.8	3	8.3	37	33.6	114	26.8
2 Magazines	13	31.	44	46.8	29	43.3	44	57.1	24	66.7	31	28.2	185	43.4
3 Magazines	14	33.3	10	10.6	15	22.4	11	14.3	7	19.4	23	20.9	80	18.8
4 Magazines or More	2	9.6	5	5.5	6	8.9	6	7.8	2	5.6	10	9.1	33	10.9
Total Replies	42	....	94	....	67	....	77	....	36	....	110	....	426	....

TABLE XVII

The Professional Magazines to Which Teachers Subscribe and the Number Subscribing to Each

Magazines	Voc. Group		Group I		Group II		Group III		Group IV		Group V		All Groups	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Indus. Arts & Voc. Educ.	31	73.6	75	84.3	59	88.1	69	89.6	33	91.7	84	85.	351	85.2
Industrial Educ. Mag.	33	78.6	60	67.4	49	73.1	56	72.7	28	77.8	34	33.8	260	63.1
Furniture Mfg. and Artisan	2	4.8	7	7.9	8	11.9	4	5.2	1	2.8	2	2.	24	5.8
Voc. Assoc. Bulletin	3	7.1	3	3.4			5	6.5	1	2.8	10	9.9	22	5.3
Popular Science Monthly			5	5.6	7	10.4	2	2.6	2	5.6	5	5.	21	5.1
American Builder	3	7.1			4	6.	5	6.5	2	5.6	5	5.	19	4.6
Popular Mechanics	2	4.8			1	1.5	1	1.3	1	2.8	11	10.9	16	3.9
Automobile Digest	2	4.8	5	5.6	3	4.5	3	3.9	1	2.8	5	5.	19	4.6
American Machinery	7	16.7					1	1.3	1	2.8	5	5.	14	3.4
Home Workshop			6	6.7	1	1.5	5	6.5	1	2.8	1	1.	14	3.4
Inland Printer					1	1.5	4	5.2	2	5.6	7	7.9	14	3.4
Pencil Points	1	2.4					1	1.3	1	2.8	10	9.9	13	3.2
Total Replies	42	....	89	....	67	....	77	....	36	....	101	....	412	....

TABLE XVIII.

The Number and Percentage of Extracurricular Activities Engaged in by the Teachers in the Various Groups

Number of Activities	Voc. Group		Group I		Group II		Group III		Group IV		Group V		All Groups	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Engaged in One Activity	19	40.4	50	51.6	34	47.2	45	58.4	21	56.8	63	44.4	232	49.2
Engaged in Two Activities	5	10.6	20	20.6	20	27.8	13	16.9	6	16.2	16	11.3	80	16.7
Engaged in Three Activities			10	10.3	7	9.7	3	3.9	1	2.7	2	1.4	23	4.9
Engaged in Four Activities			4	4.1			3	3.9					7	1.5
Engaged in None	23	48.9	13	13.4	11	15.3	13	16.9	9	24.3	61	42.9	130	27.5
Total Replies	47	....	97	....	72	....	77	....	37	....	142	....	472	....

TABLE XIX

The Amount of Time Spent Per Week by the Various Groups Engaged in Extracurricular Activities

No. of Minutes	Voc. Group	Group I	Group II	Group III	Group IV	Group V	All Groups
900 or More		1		2			3
800 to 899		2		1			3
700 to 799		8		1	2		11
600 to 699		15		3	1		19
500 to 599		2		1	2	1	6
400 to 499		4		4	1	2	11
300 to 399	1	12		12	1	6	32
200 to 299	1	3	2	6	1	5	18
100 to 199	8	12	13	9	7	13	62
1 to 99	5	13	5	10	9	29	71
Total Devoting Time to Extra-Cur.Act.	15	72	20	49	24	56	236
Median	131	367	136	292	143	97	176
First Quartile	75	142	100	125	67	48	83
Third Quartile	178	654	177	399	400	200	381

Twenty-five (5.9 per cent) of the teachers have secured master's degrees, and over 13 per cent of all teachers have contributed either to state or to national literature in the field of industrial education within the past three years.

Teacher-training institutions located within the state furnish most of the teachers of industrial arts. Many institutions were represented in the study, however. The State Normal School graduates are usually placed in the smaller cities; after the teacher's experience has increased, he moves to a larger city. The graduates of the universities teach in larger cities.

The teacher load is greater in the larger cities than in the smaller ones; not only do the teachers in the larger cities teach more hours per week, but the number of pupils enrolled in their classes is also somewhat larger. The teachers in the small communities spend more time upon extracurricular activities than do teachers in the large cities. There seems to be some compensation for the teachers in the smaller cities in the way of fewer pupils per class, and also a shorter classroom teaching week.

It is evident from the data presented in this study that the teacher must be prepared to teach in at least three different divisions of the field of industrial arts. The basic subjects are still bench woodwork and mechanical drawing. The industrial-arts curriculum is being broadened, however, to the extent that it includes such subjects as aëronautics and radio.

The field of industrial arts covers a wide range of subjects. The writer hoped to find several combinations of subjects used by a large percentage of the schools, but the data show no definite subject combinations, with the exception of woodwork and drawing.

The number of teachers using textbooks and other instructional devices in teaching industrial arts reveals two trends: (1) The subject matter in industrial-arts courses is rapidly becoming standardized through the use of textbooks. (2) In order to teach more effectively the constantly increasing numbers of pupils per class in industrial-arts courses, it is necessary to change the method of instruction. Textbooks, instruction, information, and job sheets are assisting the teachers in teaching a larger number of pupils per class.

The teachers in this state have used summer sessions as a means of earning over 50 per cent of their advancement credits. Two hundred and sixteen teachers (45.5 per cent) of the total did not attend a summer session in five years. Many of these, however, worked during the summer at a trade or in an industrial plant, thus improving their training for teaching. Less than 4 per cent of the total number of teachers showed a decided lack of interest in teaching industrial arts.

In the four-year high school, the major portion of the industrial-arts work is offered in the ninth and tenth grades; less than 31 per cent of the subjects are offered in the eleventh and twelfth grades. The work is almost entirely elective; indeed, less than 8 per cent of industrial-arts courses are required in the ninth grades, while none is required in the grades above the ninth, except for those students taking technical courses.

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

J. J. Metz, Editor

An Opportunity

With economic conditions as they are, it is almost hopeless to advocate that the school shop take a greater interest in providing school boys and girls with an opportunity for making proper use of the leisure with which they are confronted during the long vacation days ahead. It is true the youngsters are exceedingly happy that school is over. Nevertheless, so many of them are thrown on their own resources in the management of the leisure that has been suddenly thrust upon them that they are at a loss for something to do.

There is only a small number of the boys and girls who have just finished the school year who will have the opportunity to go to a summer camp. Only a small percentage of them are taken care of by such organizations as the Boy Scouts, the Girl Scouts, the Campfire Girls, boys' and girls' clubs, or summer schools of one kind or another. There is another small percentage whose vacation activities, although confined to the city, are fairly well supervised by careful and thoughtful parents. Unfortunately, however, by far the greatest number of the children spend practically all of their waking hours away from home —the planning for their activities in their own hands without any further supervision than that which can be exercised by the policeman on his beat.

Many of these youngsters could be interested and their activities guided by the shop teachers if the school shops were opened during the summer months. Of course, the school shopwork during the summer months could not be a duplication of what it is during the regular school year. There would have to be a considerable humanizing of the contact between the teacher and the pupil and between the individual pupil and his fellows in order to make the school shop attractive to the boy.

The shopwork for the summer months would have to be arranged somewhat on the plan which some shop teachers use with their various club groups. It is not uncommon for some of the members of these club groups to spend a great deal of their extra time after school hours working at this, that, or the other thing under the supervision of the shop teacher. This same spirit and the same work carried over into the summer vacation period might do much in giving direction to the activities of youngsters who now because of lack of supervision become involved in activities which bring them in touch with the police, land them in detention homes and reformatories, and start them off on a training course in crime which may overshadow, if not wreck, their entire lives.

Worth-While Accomplishments

Recently Mr. John Kratz, Chief of the Vocational Rehabilitation Service, speaking before the Conference of American Federation of Organizations for the Hard of Hearing, stated that "at least 30 persons per thousand population in the State of Mississippi are physically disabled as a result of accident, sickness, or congenital causes."

Studies made some years ago in several communities in different parts of the country, showed that 10 to 12 persons per thousand were disabled. More recent studies, however, show conclusively that the findings from these earlier surveys are too low.

Confronted by such startling facts, it is heartening to hear what the Federal Vocational Rehabilitation Service has already accomplished. Not only have they aroused the public to a realization of the need to do something for those who unfortunately become physically disabled, but they have set the machinery in motion to actually educate and prepare for employment, persons who because of their disability have definitely resigned themselves to the idea that henceforth they are helpless creatures, entirely dependent on others for their subsistence. The teachers, supervisors, and administrators of the rehabilitation service now offered in many states, can well be proud of what they have accomplished so far. Even during this time of depression, the number of disabled persons prepared for and placed in remunerative employment has been increased on an average of 5 per cent a year —a truly remarkable accomplishment considering that there are so many able-bodied workers who are out of employment.

It also is encouraging to note the businesslike method with which this rehabilitation service has been inaugurated in the various states and communities. It is wise that the rehabilitation services attempt as much as possible to make use of existing educational institutions in their training programs. Every disabled case is carefully studied and a course of training outlined. Some of the disabled persons can best be fitted for industry or business by receiving training on the job while others are placed in schools for their training. Not the least of the jobs confronting those interested in the rehabilitation of the disabled, is the establishment or reëstablishment in the handicapped of the realization that with proper training they again can become self-supporting and independent. Another of the great problems confronting the rehabilitation division, is to sell the idea to employers everywhere that disabled persons, properly trained, can take care of many jobs from which they had previously been barred.

Those who are working in the Vocational Rehabilitation Service the country over are to be congratulated upon what they have already accomplished. Their task is not an easy one and their progress, especially during times such as those through which we are passing, will necessarily be slow.

Problems and Projects

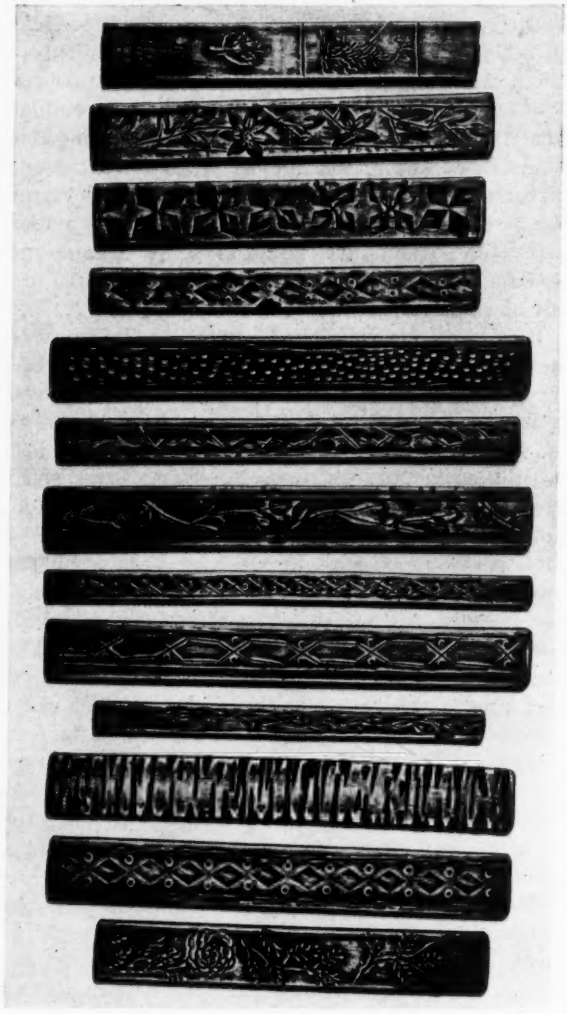
DECORATING THE SURFACE OF COLD-METAL WORK

E. G. Livingston, Iowa State College, Ames, Iowa

It is highly desirable that students in industrial arts be given every opportunity and a great deal of encouragement to develop originality. The writer has been surprised and pleased many times by the inventiveness and the creative ability displayed by a student in his classes. As teachers, we are so prone to impose our ideas, our designs, our ways of doing things upon our pupils, that we stifle a latent power, which if allowed to receive expression, would bring lasting pleasure to both teacher and pupil.

This extending of opportunities for the development of originality is especially desirable in the preparation of prospective teachers of industrial arts. Certainly the many demands made upon the teacher of industrial arts at the present time with the increase of hobby clubs and the diversified shop program make it imperative that he have the ability to adapt himself to many situations.

The accompanying illustration shows a method devised by



Decorative patterns produced with ordinary tools, on flat iron

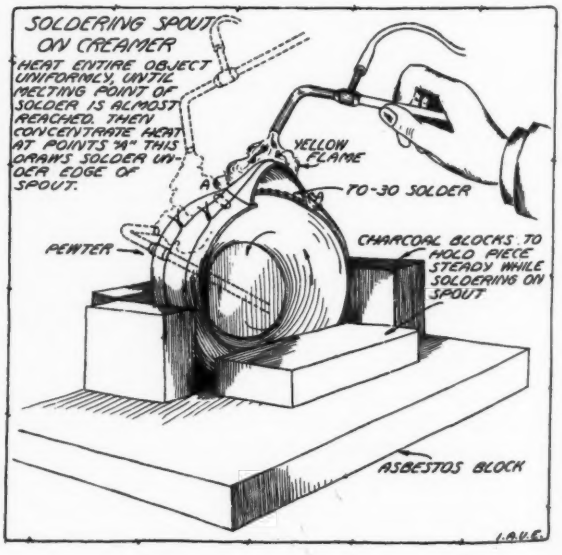
Decorated iron used in making an aquarium stand

Norbert C. Ballenbach, a student, when faced with the problem of designing and decorating a project made of cold metal. The designs were executed by means of special tool-steel stamps made by the student, a cold chisel, and a center punch. The several designs represented are only suggestive of the many that may be originated by the boy or teacher with a creative turn of mind. This method of decorating the band iron is quite pleasing in the finished project, and offers a variation from the all-over peened effect usually given such pieces.

SOLDERING SPOUTS ON PEWTER CREAMERS

Arthur A. Northrop, Eastview Junior High School, White Plains, New York

The most satisfactory spouts for creamers are those which are soldered on. The following is an instruction sheet that has been found quite effective.


SOLDERING SPOUT ON CREAMER
HEAT ENTIRE OBJECT UNIFORMLY, UNTIL MELTING POINT OF SOLDER IS ALMOST REACHED. THEN CONCENTRATE HEAT AT POINTS "A" THIS DRAWS SOLDER UNDER EDGE OF SPOUT.
YELLOW FLAME
A
TO-30 SOLDER
PEWTER
CHARCOAL BLOCKS TO HOLD PIECE STEADY WHILE SOLDERING ON SPOUT
ASBESTOS BLOCK
I.A.V.E.

Method of soldering spout on creamer

Method of Procedure

Draw the contour of the desired spout. Lay this out on the end of a piece of maple, about 6 in. long and a little larger than the length and width of the proposed spout.

Carve out the shape of the spout, making due allowance for the thickness of the pewter out of which the spout is to be made.

Take a piece of paper, and by the trial-and-error method, cut and bend the paper until a pattern of the desired spout has been obtained. Then trace the pattern on a scrap piece of pewter, and cut out with jeweler's snips.

Shape pewter over wooden template held in vise, using rawhide mallet or leather-faced pewter-raising mallet.

When the spout is shaped, trim it with jeweler's snips, and file it to fit the body of the creamer. The joint should fit so well that no light can be seen through it.

Saw out of the creamer a piece of metal almost as large as the desired cream outlet.

Place the spout in position and wire it securely with medium-size binding wire.

Take 1/16-in. diameter 70–30 wire solder, and cut it into pieces about 1/16 in. long.

Both the seam and solder should be bright and clean.

Flux made of ten drops of hydrochloric acid mixed with one ounce of glycerine will preserve the surfaces from oxidation and aid in holding the solder in the desired position. The flux should cover all parts of the joint.

Place the snippets of 70–30 solder along the ledge close to the inside edge of the spout, as shown in the accompanying sketch.

Place creamer on sheet of asbestos and block up with asbestos or charcoal blocks so that the spout is at the highest point.

Heat with a blowpipe or Bunsen burner from which the air supply has been cut off, producing a yellow flame. Use a small flame.

Heat the larger mass, letting the heat radiate and be transmitted to the smaller mass. This insures uniform heating, the most important essential in soldering pewter.

Solder flows toward the hottest area, therefore, when the entire mass is uniformly heated and near the melting point of the solder, the small yellow flame is directed along the outside edge of the seams, at or directly under points indicated by a letter A. This will draw the solder under the edge of the spout and form a perfect joint.

Extreme care must be exercised as the margin between the melting point of the solder and the melting point of the pewter is very slight. As soon as the solder begins to flow, the flame must be immediately removed.

Check to see that solder has been drawn under the entire edge of spout. It may be found necessary to reheat certain sections to complete a perfect joint. If any time elapses before the discovery of an imperfect section, the entire mass must be heated as previously described.

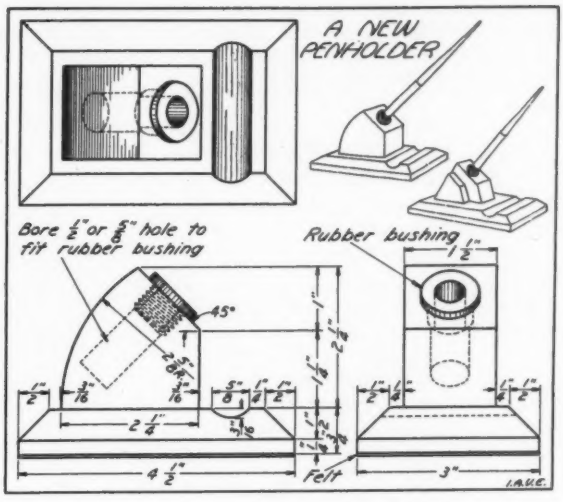
Trim the surplus metal within the spout with small curved jeweler's snips. Finish with small half-round and round files. A small dowel rod wound with a piece of emery paper or cloth will be found very helpful for finishing and polishing the metal around the joint.

A NEW PENHOLDER

Frank Slepicka, Chicago, Illinois

In times like these when instructional supplies are hard to get, teachers are seeking problems that take a minimum amount of material, and yet are different.

Such a prospect, suitable for the junior-high woodshop and very economical of material, is the modernistic penholder shown herewith. Much of it may be made from scraps of wood that have been glued into a block. This project encompasses a variety of operations. It teaches the use of the saw, plane, brace and bit, dividers, square, gouge, file, sandpaper and finishing materials.



The construction of the project is quite simple, the only part needing explanation is the fitting of the bushing in the hole.

A hole, 1¾ in. deep, and slightly smaller than the bushing, is bored into the block. A piece of pipe the same diameter as the bushing is then used to cut threads in the upper part of the hole. In the holder shown in the illustration, a ⅜-in. pipe was used. A ⅜-in. rubber bushing, purchasable at any hardware or electrical supply store, may then be screwed into this hole, as shown. These bushings come in various sizes so they may be obtained to fit almost any pen.

The illustration shows two different penholders but these two are merely suggestions that may be varied to meet the individual taste. Perhaps the best effect can be obtained with the use of different kinds of wood glued together to give the impression of inlay. They also may be finished with black lacquer, touching up the edges with aluminum. Other combinations of strong contrasting colors also would be suitable and pleasing.

KEEPING TYPE CASES CLEAN

Crawford Park, South High School, Youngstown, Ohio

The author of this article has talked to many printing teachers who all have had difficulty in keeping the right letters in the right place in their type cases. He, therefore, explains a method which has proved exceptionally helpful in his own shop.

1. First and most important, no student is required to distribute any pi type which he finds in the case with which he is working or any other place in the room. He is asked to hand the type thus found to the teacher — and that is all. He is prevented in this way from disposing of difficult letters by placing them in some convenient crack in the desk or in the wrong case.

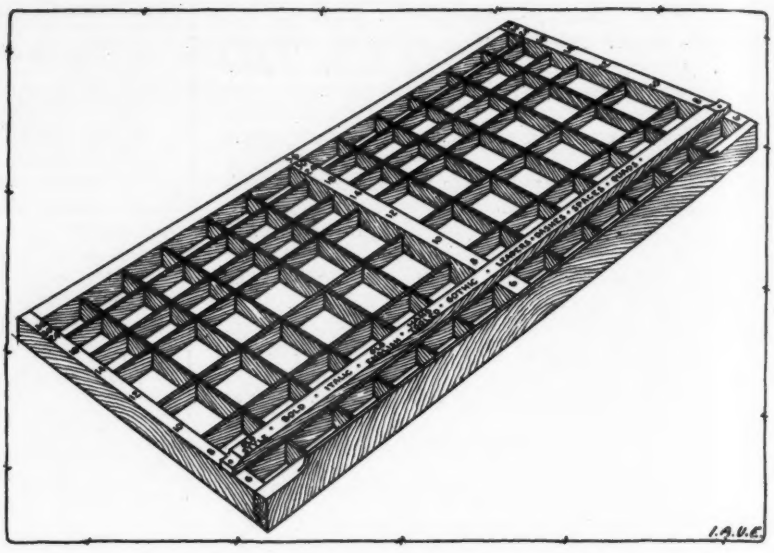
2. The pi type thus gathered is handed to a student a little at a time (the pieces may even be counted) to be distributed into an inexpensive case, such as the one shown in the illustration. The various kinds of type in the shop each have a column running vertically; the sizes run horizontally.

After the student has distributed his pi type into the compartments of this classifying case, the teacher should inspect his work. This process is repeated until all the pi is distributed.

3. When enough type of any size and kind has been accumulated in the classifying case, it is taken out and handed to a student who shows the teacher the case into which he intends to distribute the type, and then proceeds to do so. The final act of this little drama is enacted when the student shows the teacher the type case so that any letters put into the wrong place may be detected.

4. If every student who distributes type of any sort, or

sets copy, is required to show the teacher his case before and after use, the cases will show a surprising degree of cleanliness and orderliness.



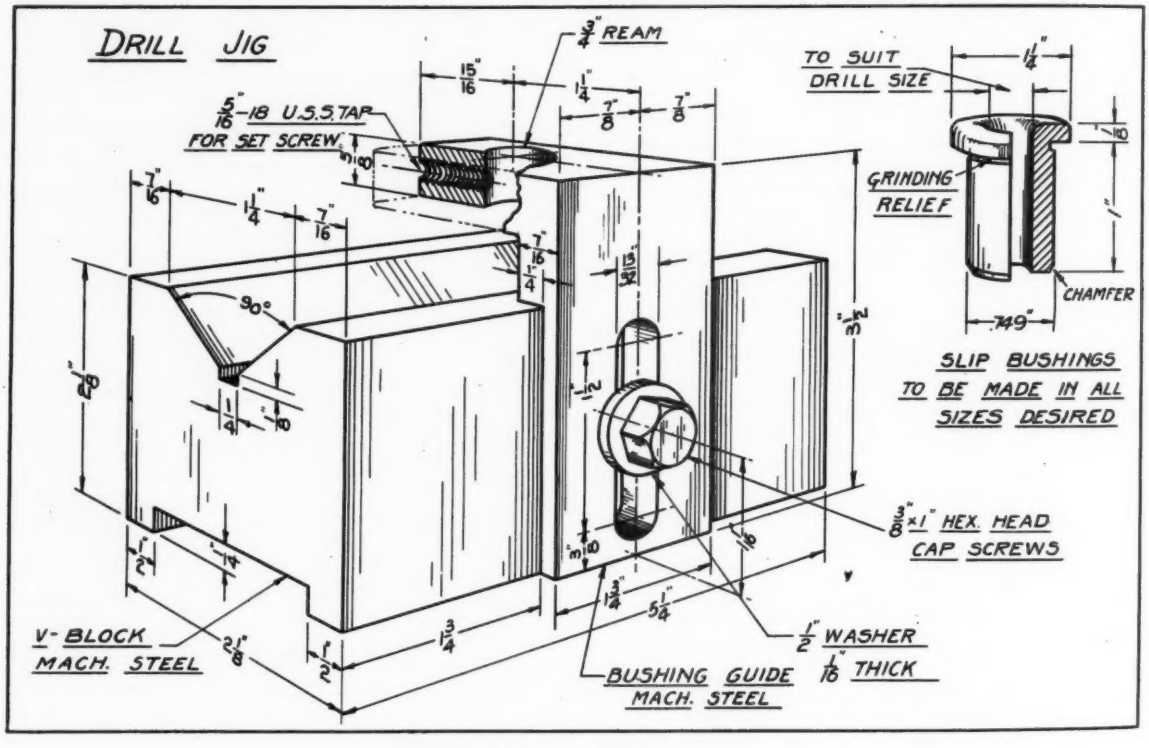
Type case arranged for the classification of pied type

DRILL JIG FOR CYLINDRICAL PIECES

W. A. DeVette and E. C. Youngbluth, Erie, Pennsylvania

A project which can be used both in the drafting room and in the machine shop, is illustrated in the accompanying drawing. This is a drill jig which may be used for all types of cylindrical work. It is composed of a V-block on which a bracket is mounted to carry different sizes of slip bushings.

The specifications for the project are given in perspective so that the drawings may be made in detail in the drafting room and then traced and blue-printed for use in the machine shop. This serves as an excellent project to correlate the work of the two departments.



A handy drill-jig for cylindrical pieces

18-INCH MODEL YACHT

Leonard Wright, Jersey City, New Jersey

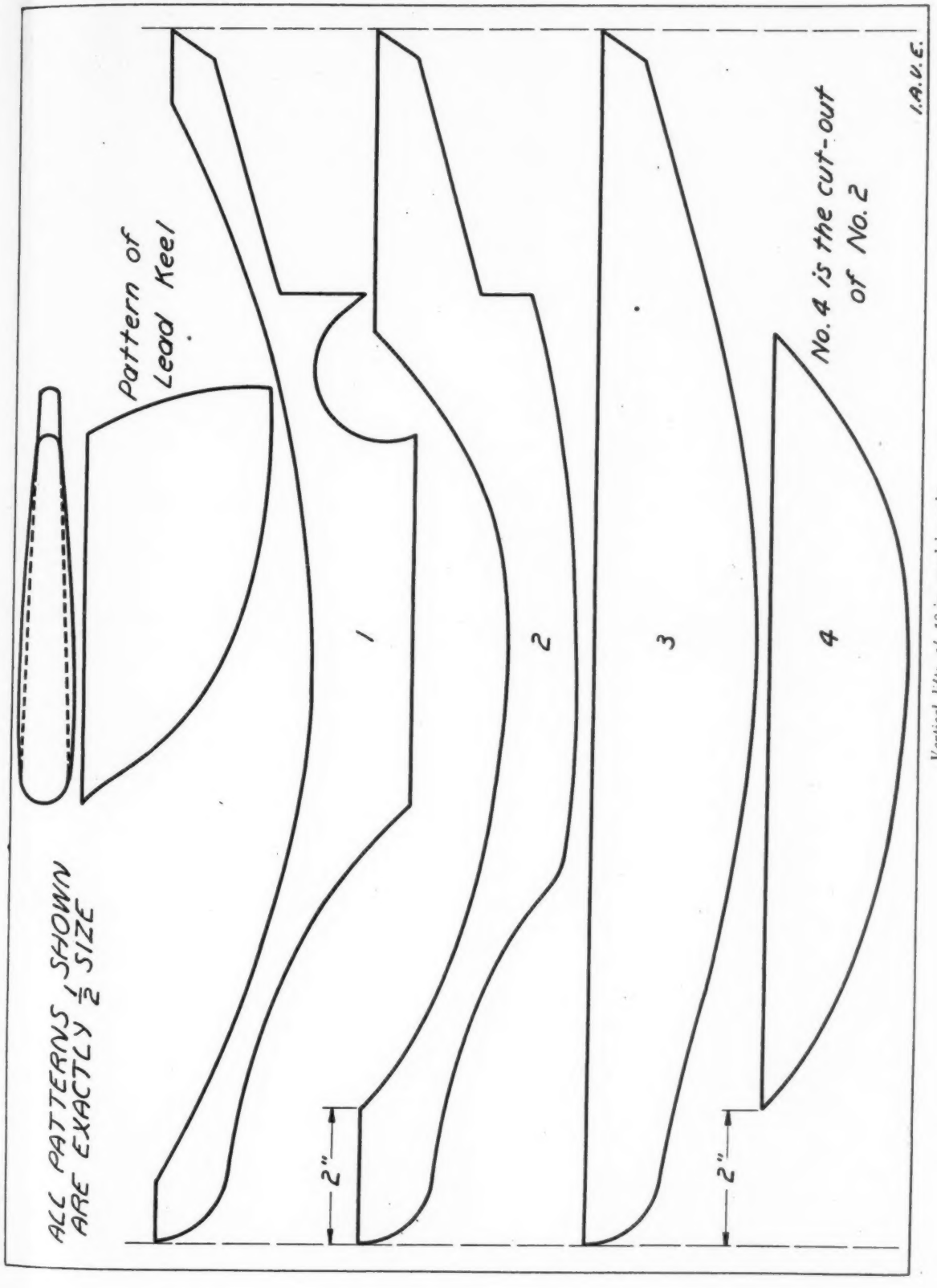
The method of building model boats described herewith has the advantage that each piece leaves guide points which help to establish the profile of the boat.

Three-quarter-inch pine is used for the pieces. Cut out the shape for the center piece No. 1 with a coping saw. The cut-out piece from this shape is discarded. The two pieces marked No. 2 are next cut. The center piece of this shape is later used as shape No. 4. Shape No. 3 is the one which establishes definite profile guides in shaping the boat. The bottom parts of the No. 2 shapes are filleted to the keel. When gluing, lay the pieces deck down on a flat surface and place the clamps near the edges or else put small blocks to fill in the cut-outs to prevent buckling.

The thin deck may be used as a template by nailing it temporarily to the boat and shaping the hull to it. Keep a center line from the bow to the keel, under the boat, so that the profile shape will not be disturbed when the sides are shaped. The cut-out will, of course, greatly aid in hollowing the boat and the advantage of holding the keel in the

vise will make for cleaner and thinner hollowing. There are other details which the beginner will discover in the building of this boat.

This method presents some real economies in material. The students like it, and produce a great number of boats that will really sail.

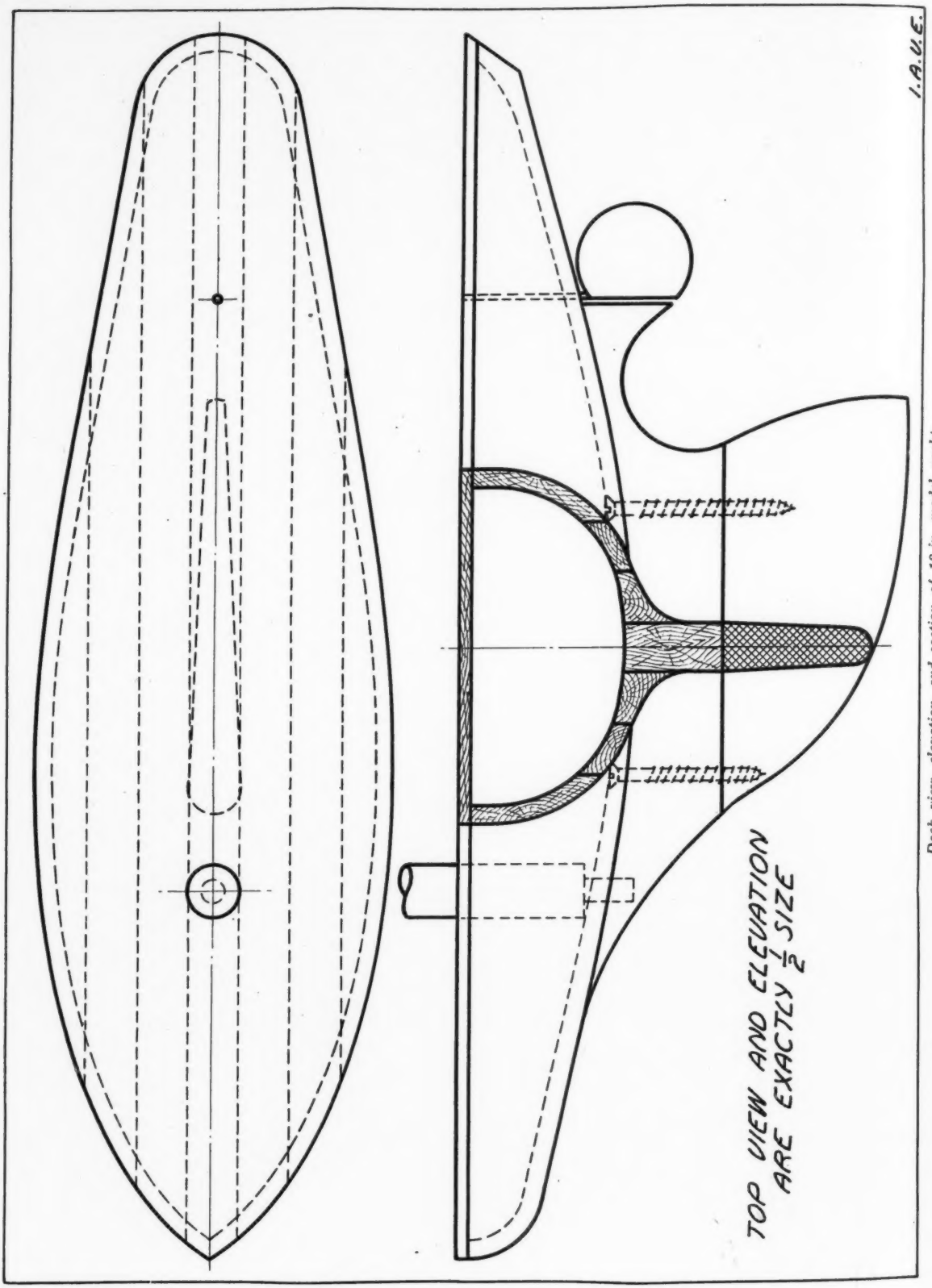


Vertical lifts of 18-in. model yacht

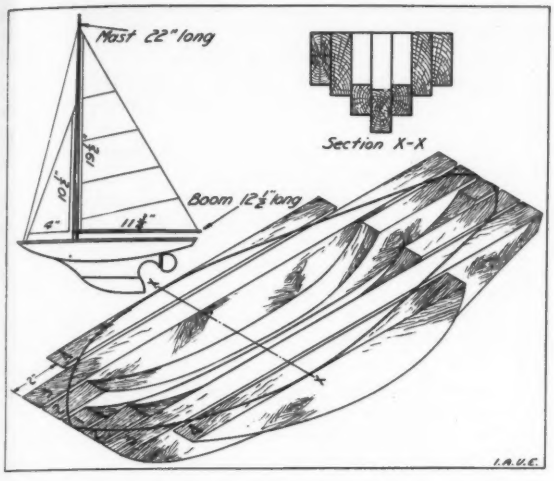
Operations

1. Cut out the following shapes, using templates for laying them out: 1 of shape No. 1; 2 of shape No. 2; 3 of shape No. 3. Use the inside of shape No. 2 as shape No. 4.

2. Glue all pieces together placing No. 4 at a point 2 in. from the bow.



Deck view, elevation, and section of 18-in. model yacht



Sail plan and lift assembly

3. Shape the deck from a resawed piece of ¾-in. pine.
4. Nail the deck on temporarily, and cut out the top of the boat to the same shape.
5. Shape the sides and use a gouge for the fillet to the keel.
6. Hollow out carefully until about 3/16 in. thick, and paint inside with two coats of good lead paint.
7. Taper the keel to the rudder post.
8. Make a mold for the lead keel or shape a solid piece like pattern.
9. Fasten the lead keel from the inside of the boat with thin wood screws.
10. Glue deck in place and nail carefully with small brads. Mark the deck with pencil lines ¼ in. apart, to look like planking.
11. Bore for the rudder tube and cement in place. Then place rudder in position.
12. Bore a ¾-in. hole for the mast through the deck and into the wood keel. The mast should be about 2 in. longer than the length of the boat.

The rigging may be as elaborate as desired but the simple rigging shown will be quite satisfactory. Three or four coats of enamel, lacquer, or lead paint in two colors, the darker color below the water line, will be attractive. Clear lacquer or spar varnish should be used on the deck, mast, and boom.

This boat, 18 in. long by 5¼-in. beam, may easily be varied, as the templates shown are half size.

THE OPEN TOOL RACK

J. S. Turnbull, Woodwork Instructor, James Monroe Junior High School, Seattle, Washington

The arrangement of the tools and the design of the individual racks shown in the accompanying cut, are the results gained through several years' study of tool racks.

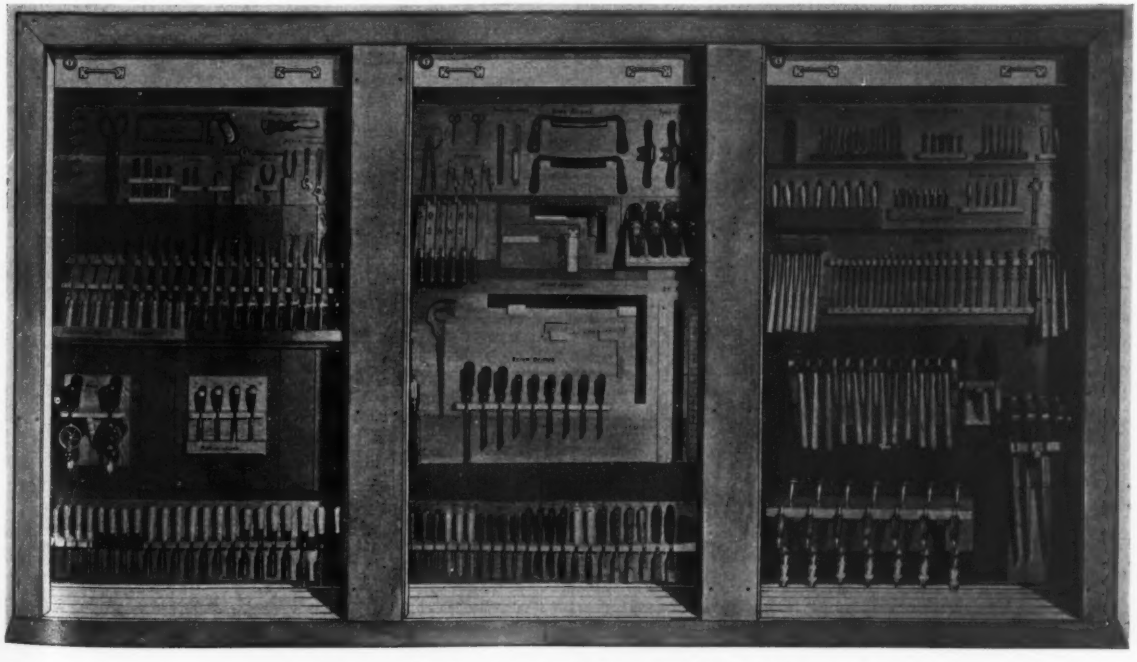
This rack is designed to accommodate woodworking classes of 36 pupils. Approximately 200 pupils take tools from this rack and return them every day. When this picture was taken it had been in use for over three years.

The names of the tools are printed near the individual racks containing them. In this way pupils quickly learn the correct names of the tools. A boy in each class inspects the rack for missing tools at the beginning and at the end of each period. A person can tell from across the room, at a glance, if any tools are missing. Some of the tools have been left out intentionally from the center section to show how easily missing tools may be detected.

The gouges and wood chisels are painted different colors according to size. They correspond in color with the silhouette on the wall. With this use of color combination it is unusual to have a pupil return a chisel to the wrong place in the rack.

A few metal tools are kept in the rack for the convenience of pupils who have some metal work in connection with their project.

The tools most frequently used, such as jack planes, bench saws, marking gauges, try-squares, and foot rules, are kept at the benches in individual wooden trays. A bench brush, mallet, and bench hook are also provided at each bench. These tools are inspected by a pupil inspector at the end of each period.



Tool rack designed by J. S. Turnbull, Seattle, Washington

The individual racks for the hammers, coping saws, and braces are made to take up as little space as possible and yet make each tool easily accessible.

In the three years that the shop has been operated with this open tool rack, only one tool has been lost. The rack takes up much less space than a toolroom. The doors slide down and the rack can be closed and locked at the end of the day.

Things to consider when making a tool rack:

1. Construct the individual racks from hard wood.
2. Make the individual racks in sections and set them up on hardwood panels. It will be found easier to paint the outline and name of the tool upon the panel than upon the wall.
3. Place all tools so pupils cannot be cut by them.
4. Group tools that are commonly used together, such as auger bits and braces, nail sets and hammers, etc.
5. Place the tool rack in a convenient location so pupils can return tools quickly to their places. Pupils are more inclined to return tools if it is easy to do so.
6. Have a definite place for all tools; no tools should be placed in the rack unless there is a place for them.

An open tool rack makes it possible for a boy to return tools with less delay and confusion. Tools are not subject to as much wear and breakage as when they are passed through a toolroom window or where they frequently are piled on the window shelf.

MONOPLANE

A Tin-Can Toy

Gerald A. Boate, Seattle, Washington

This project is especially interesting to the 12- to 14-year-olds who are just being introduced to bench metal work. The average time required to construct such a plane is nine hours.

The tin out of which these planes are made may be salvaged from 5-gallon oil cans. The tin should be cleaned, before using, with hot water and soap. If any straightening is necessary, it may be done on a level surface with a wood mallet. Care should be taken to keep the surface of the tin smooth.

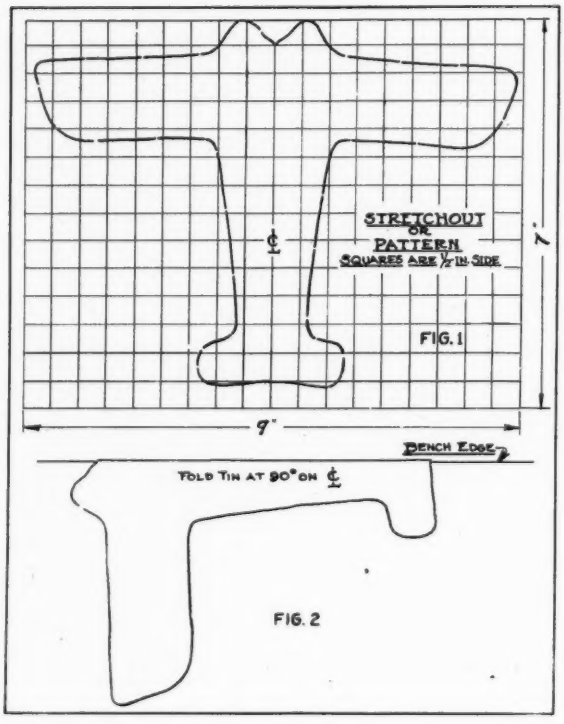


FIG. 1

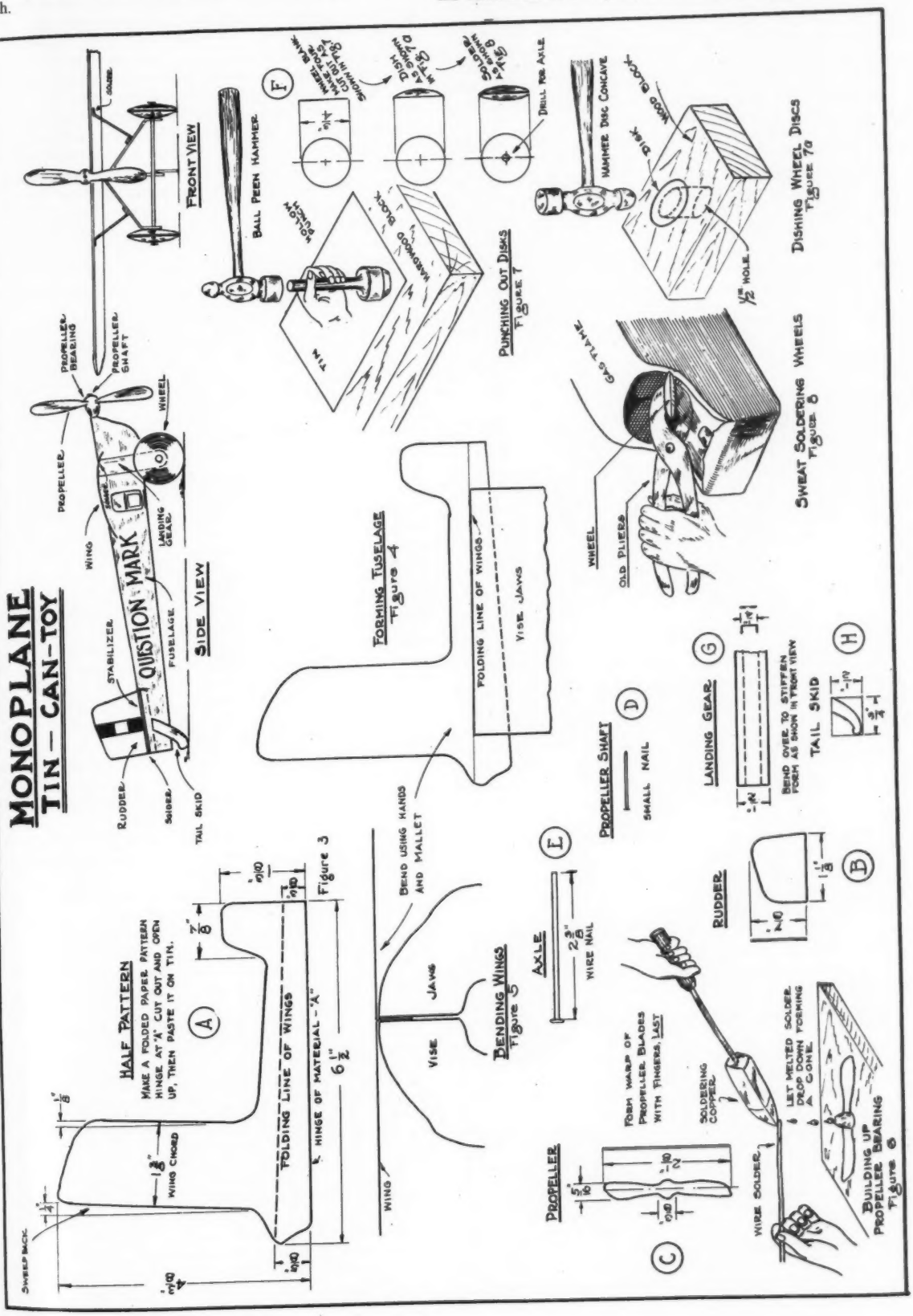
FIG. 2

Method of Procedure

1. Make a full-size paper pattern of the shape shown in Figure 1. Attach this pattern to a piece of heavy bright tin with library paste.
2. Cut out the shape with a pair of tin snips and smooth down all rough edges with a file.
3. Fold the tin over double, as shown in Figures 2 and 3, using hands and a mallet. A smooth corner of the bench or of a piece of board held in the vise will aid in creasing the center line. Keep the paper pattern on the outside while bending.
4. With the metal folded, draw the folding line on the wings, as shown in Figure 3.
5. Place the metal between the jaws of a vise so that the folding line is level with the top of the jaws, as shown in Figure 4.
6. Bend the wings down, as shown in Figure 5.
7. Cut out the rudder marked B and solder it in the position shown on the assembled side view of the plane.
8. Draw and cut out the propeller shown at C. This requires careful work as both blades must be of the same length if it is to balance and run smoothly.
9. Clean the center of the propeller with fine steel wool or emery cloth. Spread soldering paste lightly over the center and build up a bearing cone with solder. This is illustrated in Figure 6. The hot soldering copper should be held about 3 in. above the propeller so that the flowing solder is chilled slightly before it drops on the center of the propeller. After the cone has been built up, it should be filed smooth to resemble an ice-cream cone. This cone keeps the propeller from wabbling.
10. The propeller shaft is made out of a small wire nail shown at D. The point on the nail should be filed flat. Center-mark the cone and with a pin drill slightly larger than the nail, drill a hole through the cone. To get the necessary warp on each blade, draw the blades through the fingers with a twisting motion. Then holding the nail with a pair of flat-nosed pliers test the propeller by blowing.
11. If the propeller works well, clean the nail carefully and place it between the sides of the fuselage, near the top of the plane. Then solder it in the position shown in the assembled side view.
12. The tail skid, formed as shown at H, is next soldered in place.
13. If a hollow punch cannot be obtained for cutting out the wheel disks shown in Figure 7, scribe circles on a piece of tin with a sharp nail or an awl, using a 25-cent piece as a pattern.
14. Dish the wheels as shown in Figure 7a, using the ball end of a rather small ball-peen hammer. Strike light blows while dishing.
15. Spread soldering paste over the inside of the disk and place a few drops of solder into one. Holding two disks together, as shown in Figure 8, place them over a blue flame until the solder flows out at the edges. Use old pliers to hold the disks while they are heating. The instant the solder appears at the joints, plunge the disk into cold water.
16. Center-punch each wheel, and drill through it a hole the size of the nail shown at E. The head of the nail serves as one hub cap. The other hub cap is formed by a drop of solder after the axle has been placed in the landing gear.
17. The landing gear is formed of the channel shown at G. Two of these pieces are made. They must be bent and fastened as shown in the front view. The holes for the shaft are drilled slightly larger than the axle. Since the wheels and the axle are soldered together, they must revolve in the landing gear.
18. The assembled plane should next be thoroughly washed with hot soapy water to remove all soldering paste.

19. After the plane has been wiped dry, decorate it with quick-drying automobile lacquer or enamel, using a small brush.

This plane will not fly, but its maker will appreciate it highly. It may be used as a desk ornament or attached to the handlebars of a bicycle, or on an automobile radiator cap.

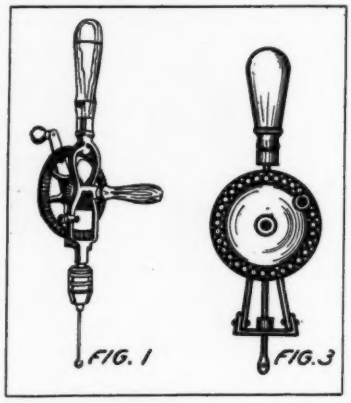


MECHANICAL WINDER FOR MINIATURE AIRCRAFT

Terence Vincent, Los Angeles, California

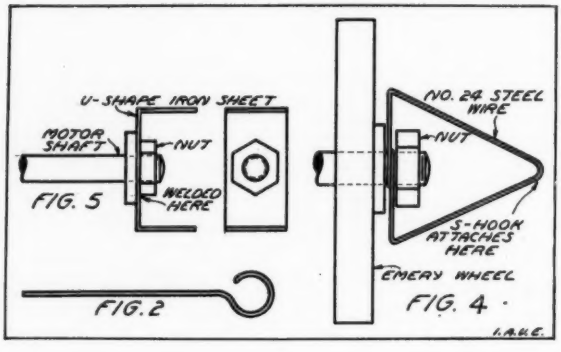
There are two distinct functions in flying miniature aircraft and these have developed two equally distinctive methods of winding rubber motors. One deals with winding the motor to obtain maximum power for endurance flights. The other attempts to get a maximum number of flights in a given period of time for demonstration purposes.

The first method places the main emphasis on championship performance. It aims at obtaining maximum power. The other places the audience first and looks upon flight performance as a secondary consideration. One of the most common mechanical winders consists of a wire hook placed into a geared hand drill, as shown in Figure 1. The hook may be made by bending a finishing nail or a piece of heavy wire into the shape shown in Figure 2, or a screw eye may be slightly opened and used in the same way.



If there is no hand drill available, a winder may be improvised out of an old egg beater. Those with a single blade are most easily adapted. Simply flatten out the winding end, round it off, and bore a hole through it. The hole should be large enough so that the S-hook may be entered or taken out quickly (see Fig. 3). Double-bladed egg beaters are harder to handle, and interesting soldering and fitting problems arise in order to turn one of these into an efficient motor winder.

Figure 4 shows a winder attachment adapted to a hand-operated geared emery wheel. It consists of a piece of steel, about 24 gauge, which is wound around the axle once or twice, with a loop formed beyond the axle so that the S-hook may be attached and detached quickly. With the nuts on the axle secured tightly against the looped wire, it will hold firmly enough during the winding process. This method is especially to be recommended for sky craft requiring from 150 to 300 turns in the rubber motor for full flight.



A similar attachment might be added on the shaft of a low-powered electric motor. A number of electric-light bulbs, placed in series with a high-speed motor, will reduce the speed sufficiently to avoid breakage in winding the rubber motors.

Accurate winding of turns or a keen sense of tension-touch must be developed if an electric motor is used for winding, otherwise many rubber motors will be wrecked. Unfortunately, the wrecking of a full-powered motor, frequently also wrecks the aircraft itself. It should also be remembered that the steel wire in the S-hook should be rounded and bent back to prevent injury to thumbs and fingers. One instructor in warning his boys of this danger said: "Be careful to make these hooks properly. If the steel wire catches in your fingers, it will be wet with your personal 'red ink,' and that will rust the steel wire. We don't want any rusty wire on our airplanes." Unfortunately, it might be said that such an injury feels just about as pleasant as being snagged with a fishhook.

When winding the aircraft motor using the S-hook on any of the winders just described, two individuals are usually required — one to hold the rubber at the propeller shaft, and the winding operator who has the motor stretched to at least twice its length before beginning the winding process. As the motor gets tighter, the winding operator must walk closer to the aircraft. When the motor is finally wound for full power, then speed at detaching from the winder and attaching to the end hook and getting the skycraft launched is imperative. Many motors have been broken because a methodical flier took too long in trying to determine the wind direction or to gain the attention of his audience. Five seconds is plenty of time to elapse between the end of the winding and the beginning of the flight.

Figure 5 shows the speediest winder. Between 30 and 60 flights a minute are possible by using it in connection with an efficient low-powered electric motor. Flights per minute is what the sales demonstrator wants when demonstrating before huge crowds of youngsters in a toy department. The same desire of flights per minute is wanted, of course, by the boys and girls who want to fly their models just for fun.

The attachment shown in Figure 5 was made out of a piece of sheet iron about an inch wide. It is bent into a U shape with a hole in the center of the base large enough to fit over the motor shaft. The U must be further fastened by means of a nut. A wood disk with dowel rods properly inserted would answer just as well as the steel yoke.

To use this attachment, first determine whether the propeller is a right- or left-turning wind screw. When ready for the flight, insert the propeller into the U-shaped attachment and apply the power, winding the propeller in the opposite direction from which it turns when in flight. Be careful in applying the power to determine the time for winding accurately. It may require only a second or two. This time must be gauged accurately, otherwise many rubber motors, and probably some aircraft, will be damaged.

A HOMEMADE TENT

C. F. Winant, Albany, New York

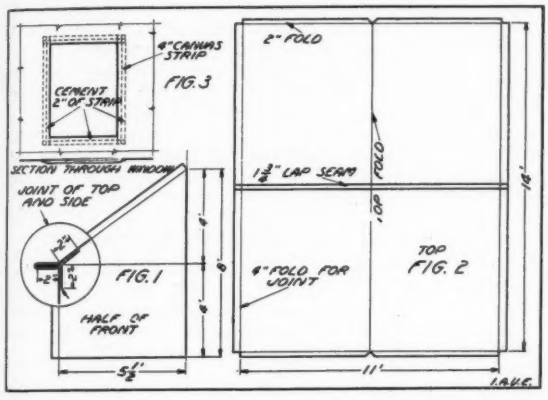
The tent described herewith was made without the use of a sewing machine. All of its seams are made with a waterproof cement. The writer of this article has a tent made according to the directions here given, and it has now seen four years' service, during which time it has withstood baffling winds and rains, and the strong rays of the sun. Every seam in this tent is still perfect, and according to all appearances, this canvas house is good for many years of service.

In making the tent, use 8- or 10-oz. army duck. As many windows may be added as the individual may desire. They should be made interchangeable, with frames of light metal. Sheet pyrolin answers very well for these windows. They

pack easily for transportation and yet are very efficient in keeping out the wind and the rain. The same frames of light metal covered with netting may be used as screens to keep out flies and mosquitos.

The cement used for making the seams is called liquid latex. It is the raw, milk-like juice of the rubber tree. It may usually be obtained at the neighborhood drug store, but the buyer should make sure that it contains at least 60 per cent or better of the rubber content. There are some cements on the market that have a latex base, but it is better to use straight latex.*

Figure 1 shows how the seams are made. The joint shown at A is used where the top and side walls meet. Making the lap in this way gives a 2-in. water drain and also a firm support for the grommets to which the guy ropes are attached. This joint should be further reinforced by a 4-in. strip placed on the inside.



Canvas comes about 30 in. wide and when making up the tops and sides and fronts, several widths will have to be jointed together to get the proper width for the tent. Plain lap seams may be used to joint these widths. Lap the edges 1¾ in. This is all that will be required. When making a seam, thoroughly wet both edges to be jointed, with the cement. Allow the cement to dry 2 or 3 minutes, then place the pieces together and press them down firmly. After finishing the tent, allow it to dry overnight before putting it to use.

The windows and screens should be made interchangeable. The metal frames are made by taking 2-in. strips of No. 26 galvanized iron. Fold this double, placing the screen or the pyrolin in the folds. A drop of solder at each corner holds the metal strips together. The corners should be slightly rounded with a file so that the screens or windows can be slid into the window pockets easily. To cut a window frame into the tent walls (see Fig. 3), make the opening approximately 4½ in. shorter than the length and width of the window. Then take 4 in. strips of canvas and cement them on the inside of the opening, as shown in Figure 3, allowing a 2-in. pocket into which the window or screen may be slid. This makes a perfectly stormproof window.

Some Questions Answered

MAPLE FINISH ON WHITE WOOD

985. Q.: I have a piece of furniture that is made of white wood, and I would like to finish it in a maple finish. Can you please tell me what I can use to get this finish? — *F. H. T.*

A.: Several colors are typical of the maple finishes: Honey, amber, antique, etc. The first is a real golden shade of fine fire and great clarity. Amber is much duller and browner. Antique is a direct combination of the two. In addition, there are several of the newer shades in the so-called Provincial finishes. You will see, therefore, that it is rather a large order to state how to "finish white wood in a maple finish."

However, I will give the method for the honey maple and suggest the others. First the wood must be sponged with clean water, dried and sanded very close and smooth, since maple finishes are very thin and essentially a part of the wood. Following the sanding with a 4/0 garnet finishing paper, dust off and apply a coat of water stain made from ½ oz. of potassium dichromate and ½ oz. acid aniline yellow, W.S., dissolved separately in ½ gal. of hot water and then equal quantities of each mixed just previously to application as a stain. Let dry and then give a coat of 2-lb. shellac made up of half white and half orange shellacs reduced with an equal volume of alcohol. To this amount add an equal amount of shellac-mixing lacquer, for better sanding and waterproofing. When dry, sand with a split 6/0 paper, dust off and apply a coat of 4-hour varnish. Let dry overnight, sand with old split 6/0 paper, and after dusting off recoat with varnish. Dry 3 days, then rub out with felt pad, crude oil, and FFF pumice stone. While the rubbing sludge is still on the work, make up a pad of clean, white, cotton waste, wring out of water and then use as a rubbing pad to carefully rub the work for the final finish. Clean off with clean, soft rags in the direction of the rubbing.

For the amber and antique finishes add such amounts of standard walnut water-stain as will give the desired shade after some experimenting. — *Ralph G. Waring.*

*The publishers will gladly furnish the address of firm handling this cement.

Personal News

¶ Franklin H. Gottshall has been appointed to teach industrial arts at Scotch Plains, Pennsylvania. He formerly held a similar position at West Lawn, Pa. He takes up his new duties in September.

¶ Mr. James Todd, Lowell, Ind., will have charge of the vocational-education department recently added in the high school in Noblesville, Ind.

Associations, Conventions

TWELFTH ANNUAL CONFERENCE ON PRINTING EDUCATION

The Twelfth Annual Conference on Printing Education was held June 26–28, at Schermerhorn Hall, Columbia University, in New York City. The conference was attended by about one hundred printing teachers.

At the first session on Monday, L. S. Downey, of New York City, presided. Greetings were given by Dr. C. C. Williamson, of Columbia University, by Hon. George J. Ryan of the board of education, and by J. Henry Holloway, Principal of the New York School of Printing. Miss Margaret T. Maguire, Principal of the McCall Vocational School, Philadelphia, Pa., talked on "Training for Appreciation"; John C. Oswald, of New York City, took for his subject, "Great Printers Through the Years"; Dr. Hellmut Lehmann-Haupt, of Columbia University, discussed "Fifty Books About Book-Making"; L. B. Siegfried, of The American Printer, talked on "Typographical Contests"; and G. P. Farrar, of The Intertype Corporation, New York, read a paper on "Review and Analysis of the 1933 Tileston and Hollingsworth Calendar."

The Tuesday session opened with Mr. Don A. Johnson, of Ithaca, as chairman. Mr. Hugo Jahn, of Wentworth Institute, Boston, Mass., opened the session with a talk on "Drawing for Printers"; Mr. C. A. Lyle, of McKinley High School, Canton, Ohio, followed with a paper on "The Development of a Course in Art for Training Printing Students"; Mr. Forest Grant, of New York City, talked on "Courses in Art for Graphic Arts"; Mr. David Gustafson, of Pittsburgh, discussed "Training for Appreciation and Service"; Mr. T. L. Anderson, Council Bluffs, Iowa, discussed the type of school, and Mr. John E. Fintz, Cleveland, the teaching methods.

At the annual dinner meeting in the faculty house of Columbia University, Mr. John J. Deviny, of the United Typothetae, Wash-

(Continued on page 6A)

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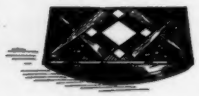

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(Continued from page 5A)

ington, D. C., was the toastmaster, and the speakers were J. S. Weyl, Dr. William E. Grady, and Dr. John H. Finley.

At the Wednesday session, Mr. Harry L. Gage, of the Mergenthaler Linotype Company, acted as chairman. Talks were given on better printing, photo-mechanical processes, and type and typography.

SUMMER CONFERENCE OF CONNECTICUT INDUSTRIAL-ARTS ASSOCIATION

The summer conference of the Central Connecticut Industrial-Arts Association was held on May 16, at Wethersfield. Fifty-eight members were present at the banquet which preceded the general meeting.

Mr. Wilson Greer, who gave the address of welcome, introduced Mr. Alfred N. Anderson, who talked on "The Aims of Industrial-Arts Education in the High School."

Mr. Paul D. Collier, State Supervisor of Secondary Education, gave an interesting talk on "Contributions of Industrial-Arts Courses in the Schools of Connecticut." He stated that industrial-arts courses are justifiable in any town, and that they should begin in the first grade and continue until graduation.

The guests present at the meeting included Harvey R. Fuller, Wethersfield; R. M. Thompson, of the State Department of Education; and F. H. Day, Alfred Burr School, Hartford.

At the business session, the Association voted honorary memberships to Dr. E. W. Butterfield, Herman Hall, Jonas M. Tompkins, Lloyd H. Bugbee, F. E. Harrington, Poindexter Graybeal, and James W. Freeman. — *Thomas E. Pascoe.*

FINDINGS OF CITY DIRECTORS' COUNCIL

During the Michigan Industrial Education Society convention held at Battle Creek, Mich., April 21, 1934, the City Directors' Council held a jury panel meeting, discussing the subject "Organization of Classes for Students Desiring Education of Less Than High-School Graduation Level and Who Desire to Enter Upon Work as Early as the Law Will Permit."

Mr. K. G. Smith, state supervisor of industrial education, Lansing, Mich., summarized the findings of this panel jury as follows:

The City Directors' Council recognizes the fact that there is a large number of job-minded boys between the ages of 15 and 18 who drop out of school for reasons other than lack of mental ability. Some of these reasons are:

1. Broken homes.
2. Because they are misfits in regular classes.
3. Because they are financially unable to continue in school.
4. Because of a short-sighted life philosophy.
5. Because they desire to learn a trade.

The Council further recognizes that there are in this age group boys of low mentality who should be cared for in special education classes as a separate problem.

There is in addition to this group now *in* school a large number of the same age or slightly older now *out* of school who should be in school if not employed.

In general these two groups, the *out-of-school* group and the *in-school* group, divide into three classes:

1. Those who desire to complete and can complete a course of high-school grade.
2. Those who do not desire to complete or cannot complete a course of high-school grade.
3. Those who desire to take special vocational courses.

The needs of the first group are being met successfully by special courses in high schools and by vocational and technical high schools. To meet the needs of the second and third groups both in school and out of school, the Council recommends a program with the following characteristics:

1. A flexible program not planned for high-school credit but based on pupil needs.
2. Instruction is on an individual basis rather than on a class basis so far as possible.
3. Coördination including guidance, placement, and follow-up is an integral part of the program.
4. Teachers with special qualifications and training are in charge of the group.
5. Provision is made for part-time employment and for temporary full-time jobs.
6. Age of entrance is the legal age of entrance into employment in this state, 15 years for employment during school hours and by NRA Code 16 years in industry.
7. The school or program is not designed for the group of low mentality who should be in special education classes and such pupils are not admitted.
8. The school encourages the attendance of boys beyond school age on a voluntary basis and endeavors to meet their needs by special programs.
9. The program of studies consists of subjects which will increase the civic and vocational intelligence of the pupils and has no fixed ratio of shop and classroom work. At least 50 per cent of time in the shop is recommended for the majority of pupils. The time may be spent in one shop or in different shops as the needs and desires of the pupils may dictate but the aim is to fit the pupil for useful employment.

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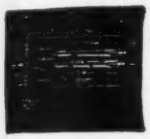
The School Shop Shopping Guide



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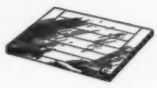

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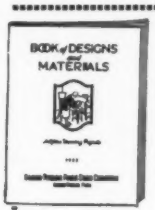

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The Council is of the opinion that local circumstances must determine whether such a program can best be carried on in:

a) A separate building;
b) A separate organization within a junior or senior high school;
c) As simply a flexible program in junior or senior high school.

News Notes

The Ohio Round-Table Conferences

The following invitation Dinner Round-Table Conferences on Industrial Arts and Vocational-Industrial Education will be held at the Ohio State University Faculty Club at 6:15 p.m. on the dates given. Dr. William E. Warner, Ph.D., Associate Professor of Industrial Arts, will preside at these Conferences.

June 27, Fog, or, a Scrutiny of Our Antecedents, by Decker and Livingston, criticized by Stone.

July 4, Vocational Education in Government Relief Projects, by Frame and Jenkins, criticized by Jenkins.

July 11, Biographical Research: Frederick G. Bonser, by Phipps and Lawton, criticized by Good.

July 18, Industrial Change and Education, by Greenly, criticized by Huntington.

July 25, Curriculum Research and Instruction Sheets, by Ludington and Fintz, criticized by Hutchinson.

August 1, Ohio's Program in Industrial Arts Education, by the State Committee, criticized by Collicott and Skinner.

August 8, The Woodworking Curriculum — Methods, by Smith, and London, criticized by Stoner.

August 15, Epsilon Pi Tau's Yearbook on Research, by Osburn and Ashley, criticized by Warner.

August 24, Men and Movements: State and National, by Sink, Pugh and Fife, criticized by the Group.

Alternate Topics

Professional Perspective Viewed Vertically and Horizontally (See Ohio Program).
Industrial Arts in the Elementary School, by Lawton.
The Practical Arts as Centers for Integration, by Warner.
Industrial Arts for Adults and Leisure, by Osburn.
Criteria for Evaluating Theses, by Seminar.
A Critical Review of State Programs, by Ashley.
The Drawing Curriculum, by Hauenstein.
Physical Planning, by Cotter and Roberts.
Public and Professional Relationships, Epsilon Pi Tau.

Consumer Values

A reprint of the proceedings of the Ohio State Educational Conferences held on April 9, 10, and 11, 1930, at the Ohio State University, which contains four articles which may be listed under the general heading "Reaching the Individual as a Consumer" may be obtained by writing Dr. W. E. Warner, The Ohio State University, Columbus, Ohio.

The four articles mentioned are:
"Things We Should Know About Pottery," by Arthur E. Baggs.
"Economic Functions of the Curriculum," by Henry Harap.
"Foods and the Nation's Leading Industry," by W. E. Nicholoy.
"Consumer Purposes and Values," by Frederick G. Bonser.

Teachers Study Economics

During the past school year the teachers of Dade County, Fla., took up the study of the new economic conditions brought about by the machine age. This was done under the leadership of Arthur Dunn, a teacher of Miami. In these studies Mr. Dunn's *The Compass* was used as the basis. This remarkable little book contains a clear, easily understood exposition of the economics of the present time, and served well to give the teachers of Miami fundamental concepts of production, exchange, division of products and services, unemployment, the gold standard, inflation, remonetization of gold, the tariff, taxation, war debts, war, differences between communism, fascism, socialism, capitalism, etc.

Health Books

The school health bureau of the welfare division, Metropolitan Life Insurance Company, New York City, has issued a series of very much worth-while health booklets, telling about the great discoveries of the medical world in the fields of pathology and health. The series, which is entitled "Health Heroes," tells about the life and work of Trudeau, Koch, Pasteur, Jenner, Reed, Nightingale, and others.